

# Atom force microscopy and magnetic force microscopy investigations of the thin films Finemet-type alloy

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Research is devoted to the investigation of the thin films Finemet-type alloy with a thickness of 10, 45, 440, 796 nm. The samples were prepared by RF (radio frequency) sputtering technic of Fe<sub>72,5</sub>Cu<sub>1,1</sub>Nb<sub>1,9</sub>Mo<sub>1,5</sub>Si<sub>14,2</sub>B<sub>8,7</sub> targets. Sputtering was held in Ar atmosphere under pressure  $1-2 \times 10^{-6}$  Torr. Thin films have been investigated in amorphous state and after annealing at temperatures 450 °C and 540 °C. Topography, magnetic pattern and mechanical properties were measured on the AFM Multimode 8 using Si probes Co-Cr coated probes. Two main results have been obtained. Firstly, topography shows formation of the nanocrystalline state for annealed samples. In amorphous state hills were not observed. Diameter of hills and their amount for annealed samples is rises with increasing of annealing temperature. Secondly, from magnetic patterns relationship between topography and magnetic structure of samples were not detected. Samples have inhomogeneous magnetic structure that can be described in frame of Random Anisotropy Model and by using fractal analysis.

## References:

[1] J. Balcerski, R. Brzozowski, M. Wasiak, K. Polanski, M. Moneta, Vacuum 83, 5182-5185 (2009).