

Nanocomposites and nanomaterial

New sintering method of SmCo_5 -based magnets

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The permanent Sm-Co-based magnets are produced by sintering of powders. In particular the SmCo_5 -based magnets are sintered during some time at temperatures higher 1100C. After such proceeding the grain size of the microstructure achieves of several micrometers.

It is known that to improve properties of magnets it is possible by nanostructuring their microstructures [1] and anisotropic materials will have the highest properties [2].

Scattering electron microscopy (JSM-6490 LV), energy dispersive X-ray (INCA Penta FETx3) and X-ray diffraction (DRON-2.0M, Fe K-rays) analyses were used for investigation the sintering method of powders of $\text{Sm}(\text{Co},\text{T})_5$ -based alloys, T=Zr, Ti and V, in the hydrogen and vacuum by the hydrogenation, disproportionation, desorption, recombination (HDDR) process under low temperatures with obtaining of the nanostructures. It was shown that the $\text{Sm}(\text{Co},\text{T})_5$ alloys are sintered by the HDDR proceeding at temperature lower 950 C. It was revealed that the porosity of sintered materials do not exceed 0,2-0,8 % (fig. 1 a).

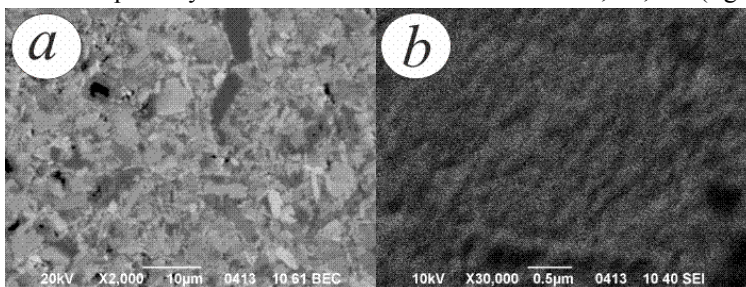


Figure 1. The microstructure of sintered $\text{Sm}(\text{Co},\text{V})_5$ alloy.

The sintered materials have fine microstructure with grain sizes in the range of ≈ 80 -100 nm (fig. 1 b).

1. Coehoorn R., de Mooij D. B., and de Waard C. Melt-spun permanent magnet materials containing Fe_3B as the main phase // J. Magn. Magn. Mat. -1989.-**80**.-P. 101-104.
2. Goll D., Kronmuller H. High performance permanent magnets // Naturwissenschaften.-2000.-**87**.-P. 423-438.