MAGNETIC PROPERTIES OF $Fe_{76}X_2B_{22}$ (X=Cr, Zr, Nb) AMORPHOUS ALLOYS

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9.7 cm

The examined alloys (obtained by melt spinning technique) belong to very interesting group of soft magnetic materials known as the "nanoperm" group. Magnetic properties (i.e. magnetic permeability, magnetic relaxation, coercive field and magnetization) of these alloys were measured for samples in the "as quenched" state as well as after one-hour annealing at temperatures from the range 300-900 K. The structural changes taking place in annealed samples were examined by applying X-ray diffraction and HREM (JEM 3010) techniques. It was shown that magnetic properties of all examined alloys can be significantly improved (e.g. permeability increases about 56 times) by one-hour annealing at temperatures closed to the crystallization temperature (e.g. 650 K for $Fe_{76}Zr_2B_{22}$ alloy). This effect can be attributed to i) annealing out of free volumes of amorphous phase (for $Fe_{76}Cr_2B_{22}$ and $Fe_{76}Nb_2B_{22}$ alloys) and ii) formation of nanocrystalline phase in amorphous matrix, with grain size of about 10 nm for $Fe_{76}Zr_2B_{22}$ alloy.

13.4 cm

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