EFFECT OF Ni SUBSTITUTION ON THE MICROSTRUCTURE AND MAGNETIC PROPERTIES IN FINEMET ALLOYS

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9.7 cm

We have studied the effect of Ni substitution on the structural and magnetic properties of the $Fe_{73.5-x}Ni_xSi_{13.5}Cu_1Nb_3B_9$ (x=0, 10, 20, 30) alloys. The increase of Ni concentration from 0 % to 30 %, causes a decrease of Curie temperature of amorphous matrix phase, T_c(am), from 593 K to 485 K. The results of the hysteresis loop measurements performed at room temperature have revealed a marked deterioration of soft magnetic properties with Ni substitution. A significant magnetic hardening was observed at the first stages of nanocrystallization for the sample containing 30 % Ni, while for the sample containing 10 % Ni it is visible only at advanced stages of crystallization. The effect of Ni substitution on the intergrain magnetic coupling was investigated via the temperature dependencies of coercivity in temperature range 300 K – 700 K. For all samples the coercivity markedly increases as temperature approaches T_c(am), indicating a decrease of exchange coupling between grains. This degradation of magnetic coupling at elevated temperatures is strongly enhanced by an increase of Ni content in the investigated samples.

13.4 cm

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