MICROSTRUCTURE AND MAGNETIC PROPERTIES OF AMORPHOUS AND NANOCRYSTALLINE FeMoBCu ALLOYS

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Thermal evolution of microstructure and magnetic properties of $Fe_{(80-x)}Mo_8B_{12}Cu_x$ (x = 0,1) splat-quenched amorphous alloys upon structural relaxation and devitrification have been studied by DSC, X-ray diffraction, TEM and magnetic measurements (TMG, VSM and SQUID).

The crystallization behaviour and microstructure are significantly modified by Cu addition, which reduces the crystallization onset temperature and delays the appearance of boride phases. After the first crystallization event, the microstructure of Cu containing alloy consists of an homogenous distribution of bcc-Fe type nanocrystals embedded in a residual amorphous phase while that of the Cu-free alloy contains, besides bcc-Fe type crystals with a broad distribution of grain sizes, Fe_3B crystals.

The Curie temperature of the amorphous alloys, close to room temperature, decreases for the relaxed amorphous samples and increases for the crystallize samples. Although the Cu containing amorphous alloy is magnetically softer than the Cu-free one, for fully crystalline samples the Cu-free alloy is revealed as softer. The dependence of the magnetic properties on the microstructure and their thermal evolution, below and upward room temperature, is discussed for amorphous and nanocrystalline alloys.