MÖSSBAUER STUDY OF MAGNETIC PROPERTIES OF $Fe_{80-x}Co_xZr_7Si_{13}$ (x = 0 - 30 at.%) BORON-FREE AMORPHOUS ALLOYS

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Amorphous $Fe_{80-x}Co_xZr_7Si_{13}$ (x=0 - 30 at.%) boron-free alloys in which boron was completely replaced by silicon as a glass forming element have been prepared by melt quenching. Conventional Mössbauer spectroscopy allowed us to estimate the hyperfine fields of the amorphous alloys. Partial substitution of iron by cobalt caused the increase of hyperfine field from about 19.5T to 27.0T for x=0 and x= 30 alloys, respectively. The specialized rf-Mössbauer technique (the spectra were measured during exposure to the radio-frequency field of 0 to 20 Oe at 61 MHz) permitted us to estimate soft magnetic properties of the alloys. The rf field induced effects (rf-collapse and rf-sidebands) can be observed in the ferromagnetic state only. The rf-collapse, which is very sensitive to the local anisotropy field, was observed for all amorphous FeCoZrSi alloys and revealed that the amorphous alloys studied are magnetically very soft. The rf-sidebands effect, related to magnetostriction, increases with the increase of Co content. In $Fe_{50}Co_{30}Zr_7Si_{13}$ sample the rf field exposure induced partial crystallization that was attributed to mechanical deformations related to high frequency magnetostrictive vibrations induced by the rf field. The rf induced crystallization does not occur in Co-free alloys with smaller magnetostriction. The measurements of the hysteresis loop revealed that coercivity increases for higher Co content.

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