

THE INFLUENCE OF BALL MILLING ON CURIE TEMPERATURE OF AMORPHOUS CoFeSiB POWDER

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9.7 cm

The amorphous ribbons with nominal composition Co_{70.3}Fe_{4.7}Si₁₀B₁₅ (at.%) were prepared by melt spinning technique. These ribbons were cut into small pieces (5×10 mm²) and milled up to 12 hours using a RETSCH PM4000 planetary ball mill. The milling was done under argon atmosphere at ball to powder weight ratio 31:1 with a speed of 200 rpm. X-ray diffraction on powder samples revealed no significant change of structure and after 12 hours of milling powders remain amorphous. On the other hand, observed change in crystallization process by use of differential scanning calorimetry indicate quite strong influence of milling on microstructure of milled powders. Further, from the thermo-magnetic measurements it is evident that ball milling causes the Curie temperature of amorphous phase (T_C^{am}) to increase. After 12 hours of milling the powder sample exhibited 40 K higher T_C^{am} as compared to as quenched ribbon ($T_C^{\text{am}} = 627\text{K}$). The thermo-magnetic measurements on heat-treated ribbons suggest that such increase in T_C^{am} is not only due to temperature rises during the milling and may be attributed to the combination of mechanical and thermal effects connected with nature of milling.

13.4 cm

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