

Structural evolution and magnetic properties in Fe₇₀Cr₁₀B₂₀ ribbons

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The magnetic and magnetoelastic properties of ferromagnetic transition metal-metalloid (TM-M) amorphous and nanocrystalline alloys can be varied within large limits in their chemical composition [1]. In fact, the addition of Cr to FeB-based metallic glasses changes the magnetic and mechanical properties of such materials [2, 3]. Thermally activated structural relaxation or crystallization processes can be also used to optimize the macroscopic characteristics of the material.

In this work, we have studied the magnetic properties of Fe₇₀Cr₁₀B₂₀ amorphous ribbons in the as-quenched state and after thermal treatments at different temperatures. The samples were obtained in our laboratory by melt-spinning in a vacuum chamber. The cross section was 5 mm x 24 μm. We have determined the Curie temperature and the crystallization point from the thermomagnetic curve, which are slightly above 100 °C and above 450 °C respectively.

We have measured the saturation magnetization and coercive force in the as-quenched state and after one hour annealing at 350, 450, 500, 600 and 700 °C. These temperatures were selected from the thermomagnetic curve of the material, in order to study the evolution of the magnetic properties with the thermal treatments.

The changes in the magnetic properties are related with structural changes and crystallization process during annealing.

References

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