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Distributions of hyperfine parameters in nanocrystalline $\text{Fe}_{83}\text{B}_9\text{Nb}_7\text{Cu}_1$ alloys

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Abstract

The effects of crystallographic change induced during annealing process upon the magnetic properties of nanocrystalline $\text{Fe}_{83}\text{B}_9\text{Nb}_7\text{Cu}_1$ alloy were investigated by using Mössbauer spectroscopy. Special focus was concentrated on the structures of interface (IF) layer, which is a region between a nanocrystalline and amorphous matrix (AM). As-quenched amorphous ribbons were flash annealed in temperature range between 623 and 823 K to obtain different stages of crystallization. Revised Vincze method was used to extract the distributions of hyperfine parameters. Mössbauer spectra consist of both sharp sextet due to BCC-Fe phase and three binomially distributed sextets due to AM, the diffused region (DR) and IF layer, respectively. By examining the distributions of hyperfine parameters, DR in which magnetic interactions diffused out to AM could be singled out.

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