Distributions of hyperfine parameters in amorphous $Fe_{78}Al_4Nb_5B_{12}Cu_1$ alloys

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Abstract

Amorphous state of ribbon-type melt-spun $Fe_{78}Al_4Nb_5B_{12}Cu_1$ alloy has been studied by Mössbauer spectroscopy. A revised Vincze method was proposed and the distribution of hyperfine field, isomer shift, and quadrupole line broadening of the sample at various temperatures between 13 and 400 K have been evaluated. Temperature variation of average hyperfine field could be explained by Handrich's molecular field model. It was also found that half-width of the hyperfine field distribution was 4.7 T at 13 K and that it was nearly constant up to 400 K. Average line broadening due to quadrupole splitting distribution decreases with increasing temperature from 0.31 mm/s at 13 K to 0.19 mm/s at 400 K, whereas that due to isomer shift distribution is effectively unchanged at 0.045 mm/s. Curie temperature of amorphous $Fe_{78}Al_4Nb_5B_{12}Cu_1$ alloy was determined to be 450 K. © 2000 Elsevier Science B.V. All rights reserved.

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