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Structure modification and recovery of amorphous $\text{Fe}_{73.5}\text{Si}_{13.5}\text{B}_9\text{Nb}_3\text{Cu}_1$ magnetic ribbons after autoclave treatment: SAXS and Thermodynamic analysis

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Abstract

The structure, crystallization kinetics and magnetic property of as-quenched $\text{Fe}_{73.5}\text{Si}_{13.5}\text{B}_9\text{Nb}_3\text{Cu}_1$ amorphous ribbon (R0) as well as ribbons after autoclave treatment at 100 °C and 150 °C (R1 and R2) have been systematically studied by various techniques. With increasing autoclave treatment temperature, the measured structural, kinetic and magnetic parameters of samples increase firstly, i.e. $R0 < R1$; and then decrease or recover to the as-quenched sample, i.e. $R2 < R1$ or $R2 \approx R0$. These results indicate that the SROs in R1 samples increased by transforming from fcc to bcc structure during the autoclave treatment and that the autoclave treatment can decrease the large radius (r_M) MRO (medium range order), but increase the small r_M MRO. The measured structural, thermal and magnetic parameters of R2 sample have a tendency to recover toward as-quenched R0 sample. The thermal and magnetic parameters of samples after solely annealing treatment at higher temperature have no obvious recover phenomenon. The uneven actions of pressure and

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