

Phase transformation and magnetic properties of $\text{Mn}_{54}\text{Al}_{46}\text{Si}_x$

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The metastable nature of ferromagnetic MnAl usually results in its decomposition during prolonged annealing or high temperature processing. The doping of carbon to MnAl has been proved to be effective in improving the stability of ferromagnetic MnAl. In this work, we systematically studied the effect of silicon doping on the magnetic properties and phase transformation of MnAl. We prepared the $\text{Mn}_{54}\text{Al}_{46}\text{Si}_x$ alloys by using traditional induction melting method and subsequent optimized annealing processes. It is found that the addition of silicon to MnAl increases the triggering temperature for massive phase transformation of MnAl, while the magnetization of the samples is decreased. Several samples with varied atomic percent of silicon were prepared and analyzed by using XRD, SEM and PPMS.

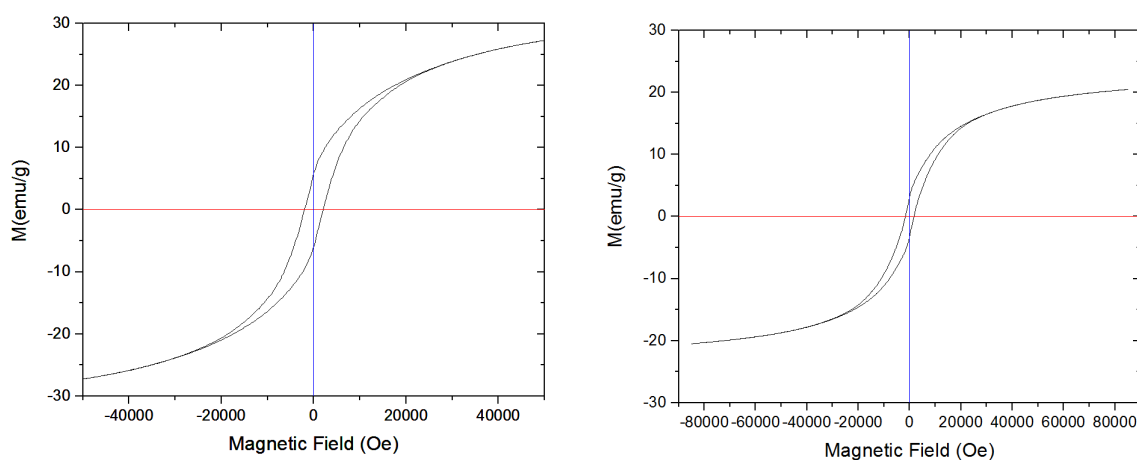


Fig. 1. Magnetic properties of $\text{Mn}_{54}\text{Al}_{46}\text{Si}_{0.5}$ and $\text{Mn}_{54}\text{Al}_{46}\text{Si}$ samples after 482°C heat treatment