

Crystal and Magnetic Properties of ^{57}Fe Doped MnAs for Magnetic Refrigeration Application

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(Received 20 June 2017, in final form 28 August 2017)

The $\text{Mn}_{1-x}\text{Fe}_x\text{As}$ ($x = 0.001, 0.003, 0.005$) compounds for magnetic refrigeration application were synthesized by using a solid-vapor reaction method. We have investigated the crystallographic and magnetic properties of $\text{Mn}_{1-x}\text{Fe}_x\text{As}$ ($x = 0.001, 0.003, 0.005$) samples by using x-ray diffractometer (XRD), vibrating sample magnetometer (VSM), superconducting quantum interference device (SQUID), and Mössbauer spectrometer. The XRD patterns, revealed that all samples exhibited hexagonal space group $P6_3/mmc$ below Curie temperature (T_C), while above T_C they belong to the orthorhombic space group $Pnma$. The temperature-dependent magnetization curves under 200 Oe between 4.2 and 320 K showed a large hysteresis in the magnetization as a function of the temperature. To analyze the meagnetocaloric effect, the value of magnetic entropy ($-\Delta S_M$) was calculated from the isothermal initial curves up to 5 T at various temperatures. Mössbauer spectra of $\text{Mn}_{0.997}\text{Fe}_{0.003}\text{As}$ sample were taken at various temperatures ranging from 4.2 to 315 K.

PACS numbers: 76.80.+y, 75.30.Sg, 75.60.Ej

Keywords: Mössbauer spectroscopy, Magnetocaloric effect, MnAs

DOI: 10.3938/jkps.71.575