

Magnetotransport properties of MnAs film on GaAs(001) substrate

A. Sinsarp, T. Manago and H. Akinaga

*Research Consortium for Synthetic Nano-Function Materials Project (SYNAF),
Nanotechnology Research Institute (NRI), National Institute of Advanced Industrial
Science and Technology (AIST), 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan*

E-mail: asawin.sinsarp@aist.go.jp

The MnAs film is recently paid attention as an effective material for applications in spintronics. In this paper we report the magnetotransport properties measured at room temperature of the MnAs(-1100) film on GaAs(001) substrate grown by molecular beam epitaxy. The film in this study is with the thickness of 250 nm. The magnetic easy axis, which is parallel to the MnAs[-1-120], is along the GaAs[110] direction. The strips of paramagnetic phase along MnAs[0001]//GaAs[-110] is observed periodically in the easy-axis MnAs[-1-120] direction. The in-plane magnetoresistances were measured in various configurations with the combination of the directions of current and magnetic field. For each configuration, the resistance decreases linearly with respect to the magnitude of magnetic field, with a hysteresis around the zero-field. The decreasing rates and the ranges of the hysteresis loop are different for configurations. The anisotropic range of hysteresis region is in agreement with that in magnetization curve measured by superconducting quantum interference device (SQUID), implying the influence of magnetization on the electric resistance. For each magnetic field direction, the anisotropic magnetoresistance for different current direction implies the influence of magnetic domain structure.