

Large Magnetoresistance at Room Temperature in InSb

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Magnetoresistance (MR) effects including Ordinary MR, giant MR, colossal MR etc. exhibit large changes in electrical resistance according to magnetic field, which has led to great interest of scientists due to improvements in the magnetic information storage, sensors and magnetoelectronics. Specially, in manganite system showing colossal MR effect the dramatic switching of resistive states can be achieved not only by a magnetic field, but also by an electric field [1]. This current switching of resistive state has received considerable attention because of their interesting physical phenomenon and potential applications as nonvolatile memories [2]. On the other hand, magnetoresistive switch effect with large MR had been reported in the Sb/MnSb nanoclusters/GaAs system [3] and Au/GaAs Schottky diode [4]. In this report, we have studied a large magnetoresistance in as-grown InSb. Samples of InSb were grown by MBE on GaAs substrate. We were fabricated Indium electrode by photo-lithography and evaporation. The mobility of our sample is about $4.0 \text{ [m}^2/\text{Vsec]}$ at 300 K. Our device shows a large magnetoresistance change and threshold magnetic field can be tunable by a bias voltage on the device at 300K. Thus, the conducting state of our device is convertible from low resistive state to high one and this change is governed by magnetic field. Current in this device can be increased more than 100mA, but the amount of current is limited in this data to protect the device from high-current damage. All of the observed curves are successfully recovered when sweep direction of magnetic field is reversed. This electrical switching device can be good candidate for a future reprogrammable electronic device.

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