

巨大磁気抵抗効果を用いたフレキシブル磁気抵抗素子の検討

Investigation of flexible magnetoresistive device using giant magnetoresistance

九大シス情¹ ○黒川 雄一郎¹, 湯浅 裕美¹

Kyushu Univ.¹, ○Yuichiro Kurokawa¹, Hiromi Yuasa¹

E-mail: ykurokawa@ed.kyushu-u.ac.jp

[Introduction]

Spintronics devices with sufficient flexibility are very useful because it can place anywhere for example human body and curved surface. Giant magnetoresistance (GMR) is one of the magnetoresistance and it can be used as magnetic field sensor [1]. The magnetic sensor with high sensitivity can be used as compass, magnetocardiograph, and magnetoencephalograph, which is good compatibility with flexibility. In this study, we investigated the GMR in the magnetic multilayer deposited on flexible substrate for the flexible magnetic sensor with high sensitivity.

[Experiment]

We fabricated the IrMn/CoFe/Cu/CoFe/NiFe multilayered film on a flexible polyimide substrate using DC magnetron sputtering method. Subsequently, the film was annealed in the in-plane magnetic field to generate in-plane exchange bias field. The magnetization of multilayered film was measured by vibrating sample magnetometer (VSM). The magnetoresistance of multilayered film was measured by four-terminal method under in-plane magnetic field.

[Results]

The magnetization curve of multilayered film obtained by VSM measurement shows that the magnetization in the bottom CoFe layer was pinned by the exchange coupling generated from the IrMn layer. Fig. 1 shows the resistance of the multilayered film as a function of in-plane field. It was greatly changed by magnetic field because the magnetizations in bottom and top CoFe layer were changed between parallel and antiparallel states. We found that the magnetoresistance ratio is 2.7%.

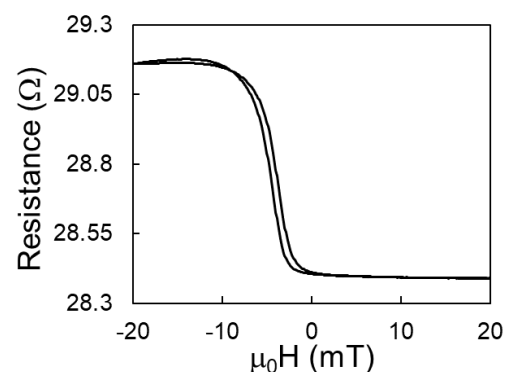


Fig. 1 Resistance of multilayered film as a function of in-plane magnetic field H .

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[1] M. N. Baibich et al., *Phys. Rev. Lett.* **61**, 2472 (1988).