QE14

Enhanced Kerr Effect with High Reflectance for Normal and Oblique Incidence in One-dimensional Three-defect Asymmetric Magneto-photonic Crystals

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The reflection characteristics of one-dimensional magneto-photonic crystal, possessing the three-defect asymmetric structure, are systematically investigated at both normal and oblique incidence. The numerical results show that the enhanced Kerrrotation and high reflectance can be simultaneously realized. A great number of layers are required in devices with symmetric geometry or less defects, while in this proposed structure only 44 layers turn out to be enough by virtue of the sufficient freedom provided by the three-defect and asymmetric configuration. The reflectance is adjusted further from 95 to 100% by changing the layer number of the rear substructure without any evident effect on the Kerr rotation. In the case of oblique incidence, the blue-shifts of the reflectance and the Kerr rotation are observed as increasing the incident angle while their values are nearly unchanged.

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QE15

Detection of Current-Driven Magnetic Domain Wall Motions Using Anistropic Magnetoresistance Effect

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Domain wall (DW) motion induced by applying a spin-polarized current pulse is expected to be used in spintronics devices. Several groups have reported current DW motion in magnetic nanowires [1-4], however the fundamental properties, such as current polarity and DW velocity, have not been well understood yet. In order to carry out detailed investigations, we studied current-driven DW motion using anisotropic magneto-resistance.

A NiFe film of 30 nm in thickness was deposited on a thermally oxidized Si substrate using a sputtering method. An arc-shaped wire was patterned by a combination of EB-Lithography and Ar-ion milling from this film. Its diameter and width were 10 μm and 450 nm, respectively. In order to introduce a DW in the wire, an external magnetic field of H_{ex}=500 Oe was applied. After reduction of the field to zero, an assisting magnetic field of H_s=14 Oe was applied (see Fig. 1). Under this condition, we investigated an influence of an applied pulse current on the wire resistance.

Figure 2 shows the change of the wire resistance as a function of time. At t=0, we applied a current pulse of 4.0×10^{11} A/m^2 with a duration time of 250 ns. The current flow direction was anti-parallel to the magnetic field. We observed a drastic resistance change of about 0.1 ohm *at* t=0. The magnitude of the resistance change was comparable to the value observed in the resistance versus magnetic fields curve in this sample. This result indicates that the DW was swept out by the application of the current pulse. Dependence of polarity and pulse width will be discussed.

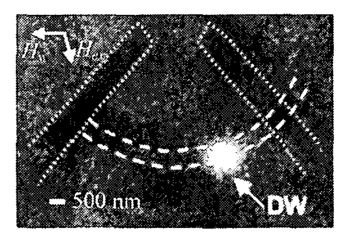

Fig. 1. MFM image

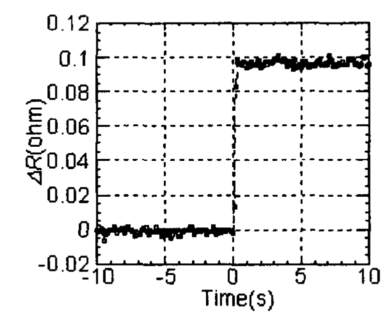

Fig. 2. Resistance change induced by a magnetic domain wall motion. A pulsed current was applied at t=0[s]

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