Control of Magnetization Switching in Highly Coercive L1₀-FePt Ordered Alloys

The reduction of volume in magnetic bits with maintaining the thermal stability of magnetization is an essential issue for the development of ultrahigh density magnetic storage devices such as hard disk drive and magnetic random access memory. A high magnetic anisotropy material leads to the good thermal stability of magnetization at a reduced dimension. An L1₀-FePt ordered alloy, where Fe and Pt monatomic layers are alternatively stacked along the c-axis (Fig. 1), shows high uniaxial magnetic anisotropy of $7 \times 10^6$ J/m³. Thus, this FePt alloy has attracted much attention as a material for the future magnetic storage devices.

Magnetization reversal process in nanosized FePt / Voltage-induced coercivity change

In order to apply L1₀-FePt to magnetic storage devices, the understanding and the control of its magnetization reversal process are important. We microfabricated the L1₀-FePt dots with various sizes, and found the change in the reversal process from domain wall motion to magnetization rotation (Fig. 2). This indicates that the magnetization reversal process is controlled by changing the size of L1₀-FePt. We also observed the coercivity change under the application of electric voltage to an ultrathin L1₀-FePt (Fig. 3), which is expected as a magnetization reversal technique with low power consumption.

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