Fe/Pt

1

2

Fe/Pt

Pt

UHV
3

1. FePt(40nm)

2. FePt-L10

Fig. 2 XRD patterns for [Fe(1.5nm)/Pt(1.5nm)]13 multilayer films

$$\Lambda = \frac{\lambda}{2\sin\theta}$$

(1)

Fig. 1 XRD patterns for FePt(40nm) thin films
In heat treated samples, the coercivity reached 13 T. This indicates the samples have shown very strong magnetic behavior. 2 Also, it suggests that the ordering degree is already high. 2

Figure 0* shows the hysteresis loops for [Fe (1.5nm)/Pt (1.5nm)]13 multilayers and FePt (40nm) thin films at various annealing temperatures. 2

Figure 3 shows the hysteresis loops for [Fe (1.5nm)/Pt (1.5nm)]13 multilayers and FePt (40nm) thin films. 2

For FePt, the coercivity is 23.9 kA/m. 0 When the thickness of the layers is increased, the coercivity decreases. 2

Figure 4 shows the annealing temperature (T) dependence of the ordering parameter (S) and coercivity (Hc) for [Fe (1.5nm)/Pt (1.5nm)]13 multilayer and FePt thin films. 2

Figure 5 shows the coercivity of [Fe(x)/Pt(x)]n multilayers at 350°C annealing temperature. 2

The ordering parameter S is given by:

\[
S = \frac{1 - (c/a)_{S_0}}{1 - (c/a)}
\]

where (c/a) is the ratio of the lattice parameters of the iron and platinum layers, (c/a)_{S_0} is the ratio of the lattice parameters of the fully ordered state, and n is the number of layers. 2

In conclusion, using direct current magnetron sputtering, we fabricated [Fe(x)/Pt(x)]n multilayers. 2

For [Fe(x)/Pt(x)]n, when x = 0.5, 1.0, 1.5, 2.0, 2.5 nm, the coercivity is 23.9 kA/m. 0 For n = 40, 20, 13, 10, 8, the coercivity at 350°C is 1120 kA/m. 2

For [Fe(x)/Pt(x)]n, when n = 40, the coercivity at 350°C is 501 kA/m. 0
Structure and Magnetic Properties of Vacuum Annealed Fe/Pt Multilayers

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Abstract: Fe/Pt multilayers and FePt thin films are prepared by DC magnetron sputtering. The as-prepared samples are subjected to vacuum annealing at temperature in the range of 300 to 550°C. The multilayered structure is an effective approach for reducing the ordering temperature of FePt. The ordering parameter S is evaluated to be 0.6 and the coercivity is evaluated to be 501 kA/m in [Fe(1.5 nm)/Pt(1.5 nm)]\textsubscript{10} multilayers at 350°C annealing temperature. This appreciable reduction is correlated with rapid diffusion at the interface of Fe/Pt.

Key words: L1\textsubscript{0}–FePt order phase; magnetron sputtering; ordering parameter; Fe/Pt multilayer

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