

Fig. 3. M-H curves for Co-W films as a function of a) composition and b) deposition time.

It was found that morphology and magnetic properties of the samples were affected by composition and thickness of the sample, as well as post-annealing treatment. Hard magnetic films were obtained for both as-deposited and post-annealed films deposited from a solution by controlling proper deposition parameters. Effort of preparation of electrodeposited Co-W thin films with perpendicular magnetic anisotropy is underway.

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Magnetization Reversal of Co/Pd Multilayers on Si Substrates and AAO Membranes

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Recently, researchers paid attention to the magnetization reversal of magnetic nanostructures because of the developments of spintronic devices and ultra-high density recording. In this study, [Co(0.3nm)/Pd(1nm)]₅ multilayers are deposited on Si(100) substrates and anodic-alumina-oxide membranes (AAO) with an average hole diameter of around 200nm in an UHV e-beam system. The out-of-plane coercivity of Co/Pd multilayers grown on Si substrates is of around 3000 Oe which is measured by the PMOKE. The magnetization reversal of Co/Pd multilayers is directly imaged by the MFM with a variable perpendicular field up to 4000 Oe. The domain nucleation and the wall motion of Co/Pd multilayers grown on Si are observed as shown in Fig. 1(a). Instead of domain-wall motion, the magnetization reversal in Co/Pd multilayers grown on AAO displays a domain rotation. Small domains are observed in MFM images as shown in Fig. 1(b). In the VSM investigation, we make a plot of coercivity vs. out-of-plane angle for both samples. They suggest a wall motion and a domain rotation for Co/Pd multilayers grown on Si and AAO templates, respectively.

In the perpendicular magnetoresistance (PMR) measurements, a large resistivity is observed in the AAO case due to a relatively small cross-sectional channel for electrons to pass. The PMR displays a negative MR behavior for both films as shown in Fig. 2. The position of maximum peak is located at 2400 Oe and 1100 Oe for the co/Pd multilayers grown on Si and AAO templates. They indicate that the magnetization reversal take place under a low field and the strength of perpendicular anisotropy is relatively low in the AAO case.

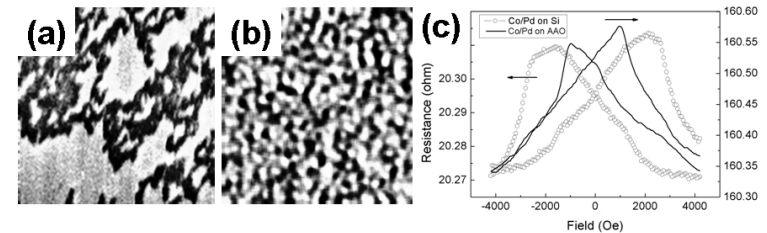


Fig. 1. The MFM images of Co/Pd multilayers on (a) Si substrates and (b) AAO membranes. The perpendicular MR curves of Co/Pd multilayers are shown in Fig. (c).