AC09

Magnetic Anisotropy of Fe Overlayers on Pt(110)

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Recently many experimental reports on the mangetic films have shown that the film morphology including their structures strongly affect the magnetism of the system[1]. Pt(110) surface shows the missing row structures along the (1-10) direction so that the film growth on top of this surface will results in the directional growth due to the strong lattice mismatch in a single direction. So one of the interesting issues in this Fe/Pt(110) system is their uniaxial magnetic anisotropy anticipated from the existence of the missing row. We have used scanning tunneling microscopy and surface magento-optic Kerr effect to show the interesting behavior of anisotropy of this Fe overlayers on Pt(110). Previously we demonstrate that Fe overlayers on a Pt(110) substrate have a strong uniaxial magnetic anisotropy. The results of SMOKE measurements for Fe grown on a Pt(110) surface are as follows. The ferromagnetic signal starts from 1 ML, with the magnetization always in-plane. The overall magnetization increases as the thickness of the film increases or the temperature decreases. We measurethe hysteresis in two different field directions, (001) and (1-10)respectively. The difference in coercivity along two different directions is very large. Also the squareness of each hysteresis loop is similar. Using these two markedly different coercivities, we could approach the magnetization reversal mechanism by applying the magnetic field in between two directions specified above. More detailed analysis on the magnetization reversal will be discussed. This uniaxial anisotropy will be changed to biaxial anisotropy when the b.c.c. phase of Fe is eventually formed above the critical thickness. This would be an indirect proof of the strain release of this directional island growth. Also the disorder at the initial stage of the deposition renders a pronounced directional growth, as shown in Co/Pd(110). We will also discuss the effect of disorder at the initial stage on the magnetic anisotropy of this film.

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PA01

Control of Local Magnetic Field of Ferromagnetic Nano Dot Array

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Characterization and understanding of magnetic properties of ferromagnetic (FM) nanodots with well defined periodicity have been a major challenge in the areas of magnetic recording media with ultra high density and magnetic devices. Much attention has been focused on the study of magnetization process of individual magnetic nanodot directly influenced by the magnetic filed of the magnetic force microscopy (MFM) probe because it provides an alternative way to manipulate the magnetic state of ferromagnetic nanodots switching between single domain and vortex state. In such the way, we can create different configuration of magnetization in an array of ferromagnetic dots, which can be useful for various applications. Different distribution of magnetic state of a few nanodots in array structure is a good source of inhomogeneous local magnetic field. Indeed, controllable inhomogeneous magnetic field induced by the nanodots leads to substantial change in transport properties of superconductors and Josephson junctions. [1,2] Moreover, MFM tip induced magnetization reversal has additional peculiarities in comparison with the process in uniform external magnetic field.

In this work, we demonstrate individual spin control of FM nanodot array by using MFM tip to create inhomogeneous local magnetic field as well as magnetization process in ferromagnetic nanodots array. In addition, the magnitude of local magnetic field induced by a single FM nanodot was experimentally determined by using Hall bar type magnetometer in order to estimate the effective inhomogeneous local field from the array of FM nanodot array structure.

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