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#### **1. Main research Results**

In this part of work, the magnetic properties of the CoPt top layer deposited on the CoPt/AlN multilayer have been studied. It has been found that the horizontal steps appear on the perpendicular hysteresis loops of layered structures annealed at 500 °C and above. It indicates that the CoPt top layer shows enhanced coercivity compared with the base multilayer. However, when the thickness of CoPt top layer increases to be above 6 nm, the CoPt top layer transforms into magnetic “isotropy”, and the coercivity enhancement gradually disappears. On the other hand, the thickness of the AlN interlayer and the repeated number of the base multilayer can influence the width of the horizontal step on perpendicular hysteresis loop. The coercivity of the CoPt top layer decreases with increasing the AlN interlayer thickness. The coercivity of the base multilayer decreases as the repeated number of the base multilayer increases. The magnetization reversal mechanism in the CoPt/AlN layered is mainly through the domain wall displacement. It is briefly estimated that the coercivity difference between the CoPt top layer and the base multilayer is probably due to the internal stress difference.

#### **2. List of publication**

- 1) Jian-jun Li, Wei-chang Hao, Huai-zhe Xu, Tian-min Wang, and Ji Shi, Enhancement of ferromagnetism in Zn<sub>0.95</sub>Co<sub>0.05</sub>O films by lithium codoping, *Journal of Applied Physics*, 106, 063915 (2009).
- 2) Takashi Harumoto, Javed Iqbal, Xiaofang Liu, Ji Shi, Yoshio Nakamura, Ronghai Yu, Effects of hydroxyls on the structural and room temperature ferromagnetic properties of Co doped SnO<sub>2</sub> nanoparticles, *Applied Physics A*, 97 (2009) 211
- 3) Y.X. Yu, Y. Hodumi, J. Shi and Y. Nakamura, Effects of AlN Layer Thickness on Magnetic Anisotropy and Transport Phenomena of CoPt/AlN Layered Structure, *Vacuum*, 84 (2009) 158.

#### **3. International and domestic conferences**

- 1) Y. Yu, J. Shi, and Y. Nakamura, Thickness-dependent perpendicular magnetic anisotropy of CoPt layer on CoPt/AlN multilayer. 11<sup>th</sup> Joint MMM-Intermag Conference Jan. 18-22, 2010
- 2) Y. Yu, J. Shi, and Y. Nakamura. Magnetic anisotropy of CoPt/AlN multilayered films. Symposium on development and evaluation of nano-composites and coming generation composite materials, 9-10 January 2009, Fukuoka, Japan.

- 3) Y. Yu, J. Shi, and Y. Nakamura. Elastic strain induced magnetization antiparallel alignment in perpendicular anisotropic CoPt/AlN layered structure. Annual Meeting of Japan Institute of Metals, 15-17 September 2009, Kyoto, Japan.
- 4) Y. Yu, J. Shi, and Y. Nakamura, AlN layer thickness influence on magnetic anisotropy of CoPt/AlN multilayer. Tsinghua Univ.-Tokyo Tech.-Xiamen Univ. Joint Symposium on Advanced Materials, 22-24 November 2009, Xiamen, China

#### **4. International Collaboration**

Joint researches have been conducted with research groups at Tsinghua University and Dailain University of Technology.

國際的共同研究