



The structures and magnetic properties of Co_2MnSi and Co_2MnAl half-metallic materials

by Miss Ji Xin

Date: 15th October 2009 (Thursday)
Time: 12:30pm to 1:00pm
Venue: EA-02-11 (Executive Seminar Room)

Abstract

The exploitation of advancement in the field of spintronics has realized the application of high sensitive magnetic MgO-barrier TMR reading head in the Hard Disk drives (HDDs) with area density of 375 Gbits/in². However, with the discovery of half-metallic materials and the theoretical expectation, CPP-GMR has attracted more attention due to the theoretically 100% polarization at Fermi level of these half-metallic materials which are predicted to exhibit an huge enhancement of MR ratio. One of the most promising candidates among all these half-metallic materials is Co-based full-Heusler alloy, such as Co_2MnSi . Heusler alloy attract more attentions is mainly because of its relatively high Curie temperature. Meanwhile, it has many technical applications like spin-injection devices, spin- filters, tunnel junctions and GMR devices. Interestingly, Co_2MnSi exhibits three different structures, $L2_1$, B2 and A2, in which the $L2_1$ structure was predicted to be Heusler structure, and B2 structure is formed when $L2_1$ structure contains Y-Z disorder, while A2 structure is formed when X-Y and X-Z disorder occur. In my study, both Co_2MnSi and Co_2MnAl full-Heusler alloys were chosen to observe their structure and magnetic property. A 30nm thickness CrRu seedlayer with small roughness was used to induce the half-metallic materials. Both temperature effect and thickness effect on the structure and magnetic property were discussed. In addition, a thin Pt buffer layer was added to see the buffer layer effect. Finally, a summary of the temperature effect, thickness effect and Pt buffer layer effect were given in conclusion.

Miss Ji Xin Speaker

Miss Ji Xin was graduated her Bachelor and Master degree in USTB (University of Science and Technology, Beijing). She is currently pursuing her second year PhD degree in Department of Materials Science and Engineering, NUS. Her research topic is the application of Half-metal in spin-tronics and is now under the supervision of Dr. Chen Jingsheng in NUS and Dr Han Guchang from Data Storage Institute.

Dr Xue Jun Min Host

All are Welcome!