Magnetic Interfaces and Nanostructures
Room: Southwest Exhibit Hall - Session MI-ThP

Magnetic Interfaces Poster Session

MI-ThP1 Investigations of Magnetic Overlayers at the Advanced Photon Source, ***G.D. Waddill***, Missouri University of Science and Technology, *S.W. Yu*, *M.T. Butterfield*, Lawrence Livermore National Laboratory, *T. Komesu*, Missouri University of Science and Technology, *J.G. Tobin*, Lawrence Livermore National Laboratory

Magnetic overlayers of Fe and Co have been investigated with X-ray Magnetic Circular Dichroism in X-ray Absorption Spectroscopy (XMCD-XAS) and Photoelectron Spectroscopy (PES), including Spin- Resolved Photoelectron Spectroscopy (SRPES), at Beamline 4 at the Advanced Photon Source (APS). Particular emphasis was placed upon the interrogation of the 2p levels of the Fe.

MI-ThP2 Magnetic Properties of Size-Selected Fe (FeAu) Nanoparticles, ***K. Paredis***, University of Central Florida

We report the magnetic properties of size-selected Fe and FeAu nanoparticles (NPs) supported on SiO2/Si(001). These microscopic properties are dominated by two key parameters: finite size effects and surface effects.

In order to systematically study size effects, we use the method of inverse micelle encapsulation (PS-P2VP diblock - cop ol ymers) for the growth of the nanoparticles. This approach results in Fe (and FeAu) NPs with a high homogeneity in size, shape and inter-particle distance. Following this method, the NP size can be tuned by changing the length of the polymer head (P2VP) while the interparticle distance can be modified by changing the length of the polymer tail (PS). Investigating these NPs in-situ (ultrahigh vacuum) after the removal of the encapsulating ligands by means of a variable temperature magneto-optical Kerr effect set-up enables the determination of: (i) the temperature dependen ce of the coercivity and remanence of the NPs, (ii) the blocking temperature for the ferromagnetic-superparamagnetic transition, and (iii) the direction of magnetization in anisotropic nanostructures . This new insight constitutes a step forward towards unrave l ling the influence of the NP geometrical structure (size and shape) on its magnetic properties. Additionally, by varying the interparticle distance we can probe the role played by particle-particle interactions in the collective magnetic behavior.

MI-ThP3 Fabrication of a Non Local Spin Logic Device with Exfoliated Graphene Channel, ***J.R. Abel***, *A. Matsubayashi*, *J.J. Garramone*, *V.P. LaBella*, University at Albany

The use of the electron spin has gained considerable attention lately as a possible substitute for charge-based electronics [1,2]. This poster will focus on the fabrication of a spin logic device that utilizes graphene as the spin transport channel since graphene has been shown to have a long spin lifetime at room temperature [3]. The device is prepared utilizing exfoliated graphene on SiO_2. The injection and readout contacts were fabricated with and without aluminum oxide as a tunnel barrier which was deposited using thermal evaporation of Al in ultra high vacuum (UHV) and then subsequent oxidation in O_2. Then Co/Au was deposited under high vacuum and 100-200-nm-wide contacts were pattered using e-beam lithography followed by a standard liftoff technique. Scanning electron microscopy and optical images will be presented of the fabrication process and the device. Non-local spin valve and Hanle measurements are being pursued to characterize the spin injection polarization and the spin relaxation in the graphene channel.

[1] Behin-Aein, B., Datta, D., Salahuddin, S., Datta, S. Nat Nano 5:266-270 (2010)

[2] Dery, H. Dalal, P., Cywinski, L. & Sham, L.J. Nature 447, 573-576 (2007)

[3] Tombros, N., Jozsa, C., Popinciuc, M., Jonkman, H.T., Van Wees, B.J. *Nature*, 448 (7153), pp. 571-574 (2007)

MI-ThP4 Magnetic Properties of $Zn_{1-x}Mn_xO$ Thin Film Grown by Pulsed Laser Deposition, ***T.C. Wu***, *Y.C. Yeh*, *D.R. Liu*, National Applied Research Laboratories, Taiwan, *H.J. Lin*, *M.J. Huang*, National Synchrotron Radiation Research Center, Taiwan

In this paper, $Zn_{1-x}Mn_xO$ (x=0~0.1) thin films were grown on corning glass 、sapphire (0001) and silicon (100) substrates by pulsed laser deposition (PLD). Atomic force microscopy (AFM) and magnetic force microscopy (MFM) were used to characterize the surface properties of $Zn_{1-x}Mn_xO$ thin film, and the high-resolution x-ray diffraction (XRD) was used to measure the crystallographic structure of this film. Moreover, superconducting quantum interference device (SQUID) magnetometer was employed to investigate the magnetic moments. X-ray magnetic circular dichroism (XMCD) spectra of $Zn_{1-x}Mn_xO$ films were also measured to clarify their spin and orbital magnetic moment properties. Integrating above measurements, these results reveal that substrate plays an important role and oxygen is the key factor for magnetic properties of $Zn_{1-x}Mn_xO$ thin films.

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