Magnetic Interfaces and Nanostructures
Room Hall D - Session MI-TuP

MIND Poster Session

MI-TuP1 Static and Dynamic Magnetic Properties of FeGa/NiFe Multilayer Heterostructures for Multiferroic Applications, *C.R. Rementer, Q. Xu, P. Nordeen, G.P. Carman, Y. Wang,* ***Jane P. Chang,*** University of California Los Angeles

Iron-gallium (FeGa) is one of the most promising magnetic materials for use in composite multiferroics due to its high piezomagnetic coefficient (3 ppm/Oe) and high stiffness (70 GPa). It has been integrated into several multiferroic systems, but generally in MHz range or below.[1] In order to make it suitable for high frequency (GHz) applications, metalloid dopants have been used to soften magnetic materials and enhance their frequency dependent properties, but at the cost of the saturation magnetization as well as magnetoelastic properties.[2] A viable approach to circumvent this trade-off problem is to integrate a magnetic material with complementary properties into magnetic heterostructures. In this work, multilayer laminates were fabricated with FeGa and NiFe, a material with excellent properties in high frequency regimes.

FeGa (hard) and NiFe (soft) were sputtered via alloy targets with compositions $Fe_{85}Ga_{15}$ and $Ni_{81}Fe_{19}$ (at%) into multilayers with layer thicknesses ranging from 3-50 nm, with FeGa being used as the first and last layer in the stack. XPS confirmed the composition and showed there was no intermixing of the layers. Static magnetic properties were evaluated via SQUID magnetometry, and it was found that the incorporation of NiFe layers reduced the coercivity by up to 85%, from 30 Oe to 4 Oe. FMR studies showed a reduction of the linewidth of up to 50%, from 70 Oe to 38 Oe. It is believed that this effect is largely due to the decrease of magnetic anisotropy dispersion in the multilayers.[3] The multilayer films maintained a high magnetostriction of up to 190 ppm, on the same order of magnitude as giant magnetostrictive materials such as thin film Terfenol-D.[4] FeGa/NiFe heterostructures have been shown to be an excellent candidate for strain-coupled microwave multiferroics.

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MI-TuP2 The Microstructure and Isotope Effects on Spin Response in Organic Spintronic Devices, ***Nuradhika Herath****, J. Keum, H. Zhang, K. Hong, J. Jakowski, J. Huang, J. Browning, S. Bennett, C. Rouleau, I. Ivanov, V. Lauter,* Oak Ridge National Laboratory

There is currently a strong drive to realize magnetoelectronic heterostructures with controls of magnetic ordering and electron-spin transport for use in the next generation spintronic devices. One proposed method to gain such controls is the use organic spintronics (OS). The general configuration of OS device consists of two ferromagnetic (FM) electrodes separated by an organic layer to form a sandwich structure. While basic concepts of OS device have been demonstrated, there is very little understanding about the detailed effects of the organic layer and the interface interactions within the multilayers on the physical properties of the system. Amongst the difficulties limiting high performances OS are the subtle structural variations, including i.e., interdiffusion of FM electrode into the soft organic layer during the fabrication. Using the depth sensitive method of polarized neutron reflectometry we have been able to probe the fine details of the structural and magnetic properties of prototype spintronic devices (STO\\LSMO\polymer\Co\Ag). We fabricated heterostructures using two electron conducting polymers (P3HT and PFO) and their deuterated substitutions to study the isotope effect of polymer layer in the spintronic devices. While our main goal is on understanding the effect of deuterium substitution on the spin-dependent electron transport, in this presentation, we will focus the details of the structural and magnetization profiles on both LSMO\Polymer and polymer\Co interfaces and their impact on the coupling between magnetic layers.

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