Magnetic Interfaces and Nanostructures Division
Room Ballroom A - Session MI-TuP

Magnetic Interfaces and Nanostructures Poster Session

MI-TuP-1 Microscopy with Momentum and Imaging Spin-Filter (Au/Ir), ***Marten Patt**, M. Escher, N. Weber, T. Kuehn, M. Merkel,* FOCUS GmbH, Germany

Momentum Microscopy is a new technique in surface science, in which the momentum (or the real-space) distribution of photoelectrons is projected onto an image plane by using a photoemission electron microscope (PEEM) column. In case of momentum imaging the k_x-k_y plane can be energy-filtered by a double-hemispherical electrostatic analyzer (IDEA) to achieve a monochromatic momentum distribution. The ability of the method to map the complete angular distribution of photoelectrons is quite successfully used for photoemission orbital tomography (e.g. at the NanoESCA in Trieste [1]). An innovative extension of this technique is to use the monochromatic electron distribution behind the double-hemispherical analyzer for 2D imaging spin-filtering. Early experiments with a NanoESCA were performed with a W(100) single crystal as electron-mirror with spin-polarization dependent reflection [2], but only the step to a Au passivated Ir (100) single crystal with long-term stable scattering properties paved the way to a broadly based scientific useability.

We will show results from our two first commercial Au/Ir 2D Imaging Spin Filters. Pre-characterizations of the Au/Ir crystal were done with LEED and a Ferrum-Detector setup [3] to find optimal preparation conditions and scattering energies for a high single-point figure-of-merit (with Sherman function >60% and Reflectivity >1%) [4]. Spin-filtered images of magnetic domains show that along the diameter of the field of view (e.g. 36 µm) more than 100 separate image points can be resolved. This increases the effective 2D figure-of-merit of this spin-filter by nearly four orders of magnitude compared to single-channel spin-detectors.

MI-TuP-2 Investigating the Magnetic Properties of the Co-Tb Phase Diagram, ***Sydney Harrington**, B. Wilfong,* United States Naval Academy*; D. Heiman,* Northeastern University*; M. Jamer,* United States Naval Academy

There has been recent interest in Co-Tb compounds for its potential use in various spintronic applications, since it has been shown to display spin-orbit torque while maintaining a low magnetic moment. While spintronic devices have been made from ferromagnetic materials, the low moment properties have been enticing for researchers since it will enable devices to become more efficient, perform at high speeds, and less corruptable. Compounds made from Co-Tb are especially interesting since Tb and Co combine a 4*f* and 3*d* orbitals, which allows for interesting magnetic coupling causing for a net magnetic moment or angular momentum to go to zero. The 3*d*-4*f* interactions are interesting to study since rare-earth elements normally have a large moment and large coercivity associated with hard ferromagnets and when a 3*d* transition element is added, these materials have an unpredictable magnetization properties.

The Co-Tb system has been shown to be advantageous in a variety of low-moment ferrimagnetic applications. In previous work, it was found that the Co-Tb system is ideal for potential spin-orbit torque with overall low-magnetization at room temperature. While various studies have shown the properties of the compound, there was not much known about the structure due to the amorphous nature in thin films. In our work, we have synthesized bulk ingots of Co-Tb in a variety of stoichiometric ratios and found that the Co_7Tb_2 is the phase responsible for the low-moment properties in various works. Through the structural and magnetic investigations of multi-phase ingots, we have determined the magnetic properties hexagonal and rhombohedral polymorphic phases of the Co_7Tb_2 structure and the effect of the other binary phases on the interfaces on the desired phase.

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