# Structural and magnetic characterization of ion-beam bombarded thin films

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When spins at the interface between a ferromagnet (FM) and an antiferromagnet (AF) couple, a unidirectional anisotropy occurs, resulting in exchange bias [1]. It is usually realized by a field shift of the hysteresis loop away from zero and an enhanced coercivity when the system is field cooled through the Néel temperature of the AF. The exchange bias effect depends strongly on the moment configuration at the FM/AF interface. The effect has been studied extensively during the past decade due to its application in spin valves for ultrahigh density magnetic recording. Our previous works [2,3] indicate that the exchange bias in FM/AF systems depends strongly on the structures of antiferromagnetic oxides used.

In this talk, first I will describe how we fabricate the exchange biased AF/FM thin films by using a dual ion-beam sputtering deposition technique [4], which involves complex processes such as dynamic oxidation, structural expansion and compression, reordering of atoms, and alloying, that all depend on the gas species and energies used. Second, I will show how we characterize the exchange-biased AF/FM thin films by analytical tools such as X-ray diffractometry (XRD), transmission electron microscopy (TEM), and SQUID magnetometry. In addition, results using polarized neutron reflectometry (PNR) [5] will also be discussed.

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