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Investigation of CoO/Fe/Ag(001) and NiO/Fe/Ag(001) epitaxial thin films X-ray magnetic dichroism

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Interfacial coupling at antiferromagnetic(AFM)/ferromagnetic(FM) interface is less understood because of the so-called magnetic frustration and the lack of direct measurement on AFM thin films. These difficulties have been partial overcome by recent development of X-ray Magnetic Dichroism on single crystalline magnetic thin films. In this talk, I will report our study on epitaxial CoO/Fe/Ag(001) system using X-ray Magnetic Circular Dichroism (XMCD) and X-ray Magnetic Linear Dichroism (XMLD). XMCD was used to measure the Fe hysteresis loops and XMLD was used to measure the response of the AFM CoO spins in response to the Fe magnetization reversal. We find that the CoO spins consist of rotatable and frozen spins with respect to the Fe spin rotation, and only the Fe uniaxial magnetic anisotropy follows the CoO frozen spins. By using focused ion beam to pattern the films into microstructures, we also observed vortex state in CoO disk imprinted from the Fe vortex state.