Soft x-ray magnetic dichroism studies of the magnetization reversal in exchange biased systems

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Soft x-ray magnetic dichroism is a powerful tool for studying the magnetization reversal in complex magnetic systems since it allows separating the contributions of individual magnetic species. In a ferromagnet the field dependence of the magnetization, M(H), typically shows inversion symmetry, i.e. M(H) = –M(–H). However, if a ferromagnet/antiferromagnet bilayer is cooled through the Neel temperature of the antiferromagnet in the presence of an external magnetic field, the hysteresis loop is shifted to negative or positive field values and the inversion symmetry vanishes. Although studied for about 50 years our understanding of this exchange bias effect is still incomplete. Using soft x ray magnetic dichroism we are able to monitor separately the magnetization reversal in the ferromagnetic layer, its impact on the magnetic order in the antiferromagnet, and to determine the contribution of uncompensated moments in the antiferromagnetic layer to the sample magnetization.
In this contribution, we will discuss recent results obtained from Ni/FeF_2 and Co/MnF_2 bilayers and describe instrumentation developed for these experiments.

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