01-Instrumentation and Experimental Techniques (X-rays, Neutrons, Electrons)

peak-to-background ratios and an almost constant resolution of 2.5 \times 10^{-3} down to \sin \theta = 0.04 \, \text{Å}^{-1} (25 \, \text{Å}^{-1}) neutrons. The contributions to the resolution are given. The performance has enabled us to determine the incommensurate magnetic propagation vector in the trilayer antiferromagnet \text{Fe}_{1-x} \text{Pd}_x \text{O}_2 and to study its temperature dependence in the range from 4 \, \text{K} to its Neel point at 21 \, \text{K}. Other examples include the magnetic scintillators from the two incommensurate antiferromagnetic phases of \text{Mn}_2 \text{Si}_2 and the pressure dependence of their magnetic structures. The design of a purpose-built cold neutron diffractometer is described.

References

PS-01.04.07 CIRCULAR MAGNETIC X-RAY DICHROISM AT Fe K-EDGE AND GD L_2,3-EDGES IN Fe/Gd MULTILAYERED FILMS
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Fe/Gd multilayered films is known to have interesting properties such as spin flop\(^*\) and temperature compensation\(^*\) phenomena which sensitively depend upon artificial period of the multilayer. In this paper, we report measurements of circular magnetic x-ray dichroism (CMXD) at Fe K-edge and Gd L-edge of Fe/Gd multilayered films as a function of artificial period of the film, using circular polarized x-rays at RE-NL1 of KEK.

It is shown that the CMX spectrum of Fe K-edge in samples with an interatomic distance of 10.5 Å is similar to that in pure Fe while the CMX spectra of Gd L-edge are opposite in sign to that in pure Gd. For Gd samples with shorter period than 5 Å, the other hand, spectra of Fe K-edge and Gd L-edge are completely reversed compared to those in samples with longer period. This means that Fe moments are dominant in samples with longer period than 10 Å, while Gd moments become dominant in samples with shorter period than 5 Å, keeping both Fe and Gd moments anti-ferromagnetic. A 1:3 separation of Gd moment was tried based on the same rule, showing clear change of both components against the artificial period of the multilayered film.

References

PS-01.04.08 MAGNETIC X-RAY DIFFRACTION FROM FERROMAGNETIC MATERIALS
P. Collins and L. J. Cernik, SERC Daresbury Laboratory, Warrington, UK

This poster describes the simple 'White-beam' technique developed at the SRS to measure non-magnetic magnetic X-ray diffraction from ferromagnetic crystals with synchrotron radiation. The results of several experiments are presented. Early work on iron\(^*\) has demonstrated the feasibility of the X-ray technique, and produced data which are in excellent agreement with, and of similar quality to, the X-ray polarized neutron measurements.

More recent work has highlighted the complementarity between X-ray and neutron diffraction in two important respects. First, X-ray diffraction has been adopted to determine the spin of rare-earth compounds of rare Earth compounds\(^*\); a measurement which can be made directly with neutron diffraction.

01.05 - X-ray and Neutron Powder Diffraction

MS-01.05.01 MODELING AS A COMPLEMENT TO POWDER DIFFRACTION EXPERIMENTS IN STUDYING INORGANIC AND ORGANIC SOLIDS. By C. M. Freeman and J. M. Newsam, BICYSM Technologies Inc, 9685 Scansion Road, San Diego CA 92130, USA

Dramatic improvements in analytical instrumentation have been paralleled by equally impressive advances in computer hardware and in modeling and theoretical methods. Computer modeling has in fact become established as a key complement to diffraction experiments, aiding in the evaluation of experimental results and in the interpretation of analytical data in terms of atomic-level behavior. A suite of modeling methods appropriate for