primitive cell corresponding to the monoclinic C-centered nuclear cell with the propagation vector k = (1 0 0). The possible orientation of the moments of the four lanthanoid atoms in the unit cell (in the positions: (1) x, 0, z; (2) -x, 0, -z; (3) 1/2+x, 1/2, z; (4) 1/2-x, 1/2, -z) can be of the types F(++++), G(+-+-), C(++—) and A(+—+). For the terbium and the erbium compound the magnetic moments are aligned within the monoclinic ab-plane of the type $[A_x, 0, A_z]$ and $[A_x, 0, -A_z]$, respectively. The magnetic structure of the terbium compound is identical to that one found earlier for $Dy_2Cr_2C_3$ ($T_N = 23$ K) (Reehuis, K. Zeppenfeld, W. Jeitschko and E. Ressouche, J. Alloys Comp. 209(1994)217). For $Er_2Cr_2C_3$ a second set of magnetic reflections with the propagation vector k = (0 0 1/2) was found indicating that the magnetic cell is doubled along the c-axis. The moments in the unit cell are ordered of the type $[G_x, 0 -G_z]$ and are oriented nearly parallel to those of the structure with k = (1 0 0). For the carbide $Ho_2Cr_2C_3$ a magnetic structure with the propagation vector k = (1 0 -1/2) corresponding to the C-centered monoclinic cell was found. Within the unit cell the magnetic order of the holmium atoms is of the type $[A_x, 0, A_z]$. In these carbibes the moments are aligned in such a way, that they form an angle with the c-axis, which is practically the same as that one formed by the two neighbouring centrosymmetric lanthanoid atoms.

PS15.02.10   CRYSTALLOGRAPHIC ANALYSIS OF MAGNETIC STRUCTURES. A. Santoro and Q. Huang, Reactor Division, National Institute of Standards and Technology, Gaithersburg, MD 20899.

The nature of the spin ordering in a significant number of simple magnetic structures can be clarified by using the expression of the magnetic structure factor and by making use of simple crystallographic principles. The method used in our study of magnetic materials is based on a careful analysis of the diffraction patterns to determine the reflections with zero or near zero intensities. A judicious application of the procedure also allows one to find out if structural ambiguities are possible, i.e. to discover if two ore more spin orderings are consistent with the same distribution of powder or single crystal intensities, and to determine all the magnetic structures generating the ambiguity. This analysis does not make assumptions about the symmetry of the structure, which may be derived a posteriori. Applications to the derivation of the magnetic structures of HoNiBC, $YBa_2Fe_3O_8$ and other compounds will be illustrated in detail.

PS15.02.11 MAGNETIC ORDERING OF THE $UCu_{2-x}Ga_{2+y}$ SYSTEM DETERMINED BY NEUTRON DIFFRACTION. N. Stüßer, Z. Zolnierek*, Hahn-Meitner-Institut Berlin, FRG, *W.Trzebiatowski Institute, Wroclaw, PL

In the last few years there has been a great interest in studying the $(RE,An)T_2(Si,Ge)_2$ ternaries which exhibit a variety of magnetic structures. These compounds, where RE stands for the rare earth, An for actinide and T for transition metal atom crystallize in the space group I4/mmm. We have examined by neutron powder diffraction the ternaries $UCu_{2-x}Ga_{2+y}$ which are structural analogues to the $ThCr_2Si_2$ compound often referred to as the 1:2:2 compounds.

Two types of magnetic ordering were established. For $UCu_{1.16}Ga_{2.66}$ and $UCu_{1.33}Ga_{2.66}$ a simple AF-I-type structure was found. In the AF-I phase the uranium atoms at (0 0 0) have a spin parallel to the c-axis whereas those at (1/2 1/2 1/2) are antiparallel. This type of magnetic ordering is very common in the UT_2X_2-series.

For the copper ternaries $UCu_{2-x}Ga_{2.5}$ with x=0.75, 0.66, and 0.5 a new type of magnetic ordering was detected which has not been observed so far for any of the known 1:2:2 type intermetallics. The new magnetic unit cell is orthorhombic with lattice parameters $A=2^{1/2}a$, $B=2^{3/2}a$, and $C=c$, where a and c specify the tetragonal unit cell of the chemical structure. The magnetic structure can be described by a propagation vector k=(0 1 0) corresponding to (1/4 1/4 0) for the chemical unit cell. In this new type of magnetic structure the moments are canted from the c-axis. The c-components still exhibit the AF-I structure and the perpendicular components point along the B-direction forming an antiferromagnetic lattice as well.

Scattering Phenomena Inelastic, Anistropic Resonant Magnetic, Etc.

PS15.03.01   NEUTRON INELASTIC SCATTERING ON ULTRASONIC EXCITATIONS IN SILICON AND GRAPHITE. E. Iolin[1], B. Farago[2], F. Mezei[3], and E.Raitman[1], [1]Institute of Physical Energetic, Riga, Latvia; [2]Institute Laue-Langevin, Grenoble, France; [3]Hahn-Meitner Institute, Berlin, Germany

The effects of the bulk ultrasonic acoustic waves (AW) on the neutron scattering in single crystals have been studied for a long time. The energy of the AW is small (~10(-7) eV at f=25 MHz). Therefore the energy spectrum of the diffracted beam could not be studied by now. We had applied the neutron spin-echo technique and directly observed for the first time inelastic scattering on longitudinal and transversal AW. The measurements were carried out with perfect and deformed Si single crystals and on a pyrolitic graphite (PG) plate. The symmetric Bragg reflections (111) and (002) were studied (L=0.54nm, beam collimated to 0.5ang.deg.). The intermediate scattering function S(Q,t) was measured and analyzed as a sum of elastic I(0) and one, two and three phonon processes. i) Perfect Si. Clear harmonic time oscillations S(t) were observed (LAW, f=209 MHz), I(0) was almost independent from the AW amplitude W (the AW induced transitions between branches of the dispersion surfaces far away from the Lorentz point). ii) Deformed Si. Small amplitude TAW (f=49 MHz) decreases I(0) by up to 30%. This decrease is not fully compensated by the inelastic scattering, so that the total intensity I(t) of the diffracted beam decreases by up to 18%. These results are corresponded to the prediction of theory, one-phonon satellites are presented mainly in the forward scattered beam. iii) Strong excited LAW in Si (f =33 MHz). We observed S(t)=exp(-t/tr), tr~3ns instead of harmonic oscillations. It may be explained by the nonlinear effects and by many-phonon neutron scattering. iiii) Graphite. The effect of LAW (f=30.5 MHz) on the total intensity was absent, but inelastic scattering was strong. It was interpreted as a neutron scattering in each mosaic bloc vibrating as a whole in the LAW. Our approach may be applied for the studies of the artificial excitations in crystals and glasses.