9.7 cm

MAGNETIC PROPERTIES OF 2-D MISFIT CHALCOGENIDES $([MX]_m)_{1+x}(TX_2)_n$

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2-D misfit chalcogenides $([MX]_n)_{1+x}(TX_2)_m$ show a regular alternating sequence of MX (M=Pb, Sn, Bi or Rare Earth; X=S or Se) and TX_2 (T=Ti,V,Cr,Nb or Ta) slabs along the $\vec{c}$ direction. The whole structure can be described as a composite layered structure. MX part shows a pseudo-tetragonal symmetry (noted Q) and the TX_2 part presents a pseudo-hexagonal symmetry (H). A mismatch occurs between the crystallographic periodicities in the $\vec{a}$ direction ($a_Q/a_H \neq$ rational) and gives an incommensurate character to these compounds. Large chemical combinations can be found in each sublattice and various stacking modes have been evidenced depending on the n/m ratio. Thus, a very large variety of materials exists in this family [1]. The first reported work on the magnetic properties of these compounds concerns the rare earth derivatives with NbS_2 as the H layer : $(LnS)_{1+x}(NbS_2)_m$ [2-3]. In that case, one observes the paramagnetic behavior of the Ln^{3+} ions. Some of these compounds exhibit a long range order at very low temperature. A careful magnetic investigation has been made on the $(LaS)_{1.19}CrS_2$ compound. In this material, the H layer presents a triangular antiferromagnetic chromium framework. The incommensurate character of the structure leads to a large distribution of the J/k coupling constant. These two structural features (frustration and modulation) can explain the formation of small two-dimensional magnetic domains in which magnetic moments are not exactly compensated. The resulting moments of these domains are in interaction and can be frozen in the easy magnetization direction giving this compound a spin glass-like behavior [4]. Recently, a new homologous type has been evidenced with the 1.5Q/1H stacking mode. For example, $([EuS]_{1.5})_{1.15}NbS_2$ compound shows a ferromagnetic long range order below 7 K involving Eu^{2+} cations in the Q layer [5]. A more complex magnetic behavior is presented by $([(Pb/Fe)S]_{1.5})_{1.16}NbS_2$ compound with a large thermal independent paramagnetism due to the metallic contribution of the NbS_2 slab [6]. **References:** [1] G.A. Wiegers, Prog. Solid State Chem. **24**, 1 (1996); [2] O. Pena et al. J. Phys. : Condes. Matter. **3**, 9929 (1991); [3] T. Terashima & N Kojima. J. Physical Society of Japan **61**, 3303 (1992); [4] A. Lafond et al. Phys. Rev. **B 52**, 1112 (1995); [5] L. Cario et al. J. Solid State Chem. **144** (1999) (accepted); [6] A. Lafond et al. J. Solid State Chem. **142**, 461 (1999)

13.4 cm

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