

Magnetic structure in CuFePt₆

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CuFePt₆ is one of the newly found ternary alloys CuMPt₆ (M; 3d elements). It has fcc fundamental structure and forms Cu₃Au-type ordered structure below 1313 K. Magnetic susceptibility shows different behavior for the alloys with disordered and ordered structures, indicating strong relation between magnetic properties and atomic ordered structures. Temperature dependence of magnetic susceptibility shows ferromagnetic transition for the alloys in both ordered and disordered state: at $T_C = 200$ K for the ordered state and at $T_C = 185$ K for the disordered state. Below T_C , susceptibility under FC and ZFC processes shows different behavior. The former shows normal ferromagnetic behavior but the latter shows successive antiferromagnetic-like transitions at $T_{N1} = 100$ K for the ordered state and at $T_{N1} = 90$ K and $T_{N1} = 30$ K for the disordered state. On the other hand, variation of magnetization at 5 K shows typical ferromagnetic curves with little hysteresis for the alloys in both ordered and disordered states.

The magnetic structure of the alloy with both ordered and disordered state has been studied with a four-circle diffractometer, FONDER at T2-2. Figure 1(a) shows temperature dependence of the intensities of magnetic scattering in the alloy with disordered state. magnetic intensities appear at 1 1 0 (X-point of fcc) below T_C , and at 1/2 1/2 0 below T_{N1} . These magnetic intensities begin to decrease below T_{N2} ; measurement at lower temperature is required for the study of magnetic phase below T_{N2} .

In the alloy with ordered state, magnetic scattering appears at 1 1 0 (Γ -point of sc) below T_C and at 1/2 1/2 0 (M -point of sc) below T_N , the same point as in the alloy with disordered state but with much stronger intensities. Figure 1(b) shows temperature

dependence of intensity and position of 110 magnetic peak. Below T_C , peak position show gradual shift with increasing intensity and takes almost constant value below T_N . These results indicate strong correlation between magnetic and atomic structures.

[1] M. Takahashi, E. Ahmed, A. K. Das, Y. Fujii, H. Iwasaki and K. Ohshima : J. Alloys. Compd. in print.

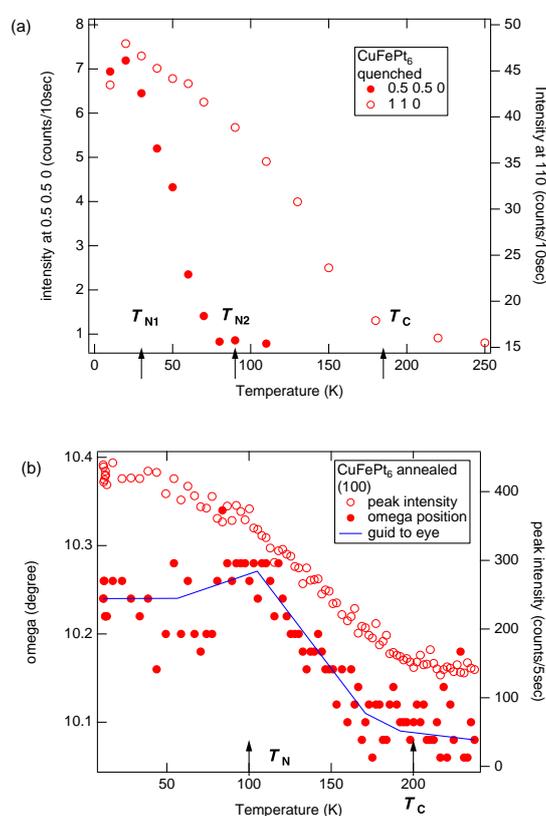


Fig. 1. (a) Temperature dependence of the intensities at 1/2 1/2 0 (closed circles) and 1 1 0 (open circles) in disordered state. (b) Temperature dependence of peak position (closed circles) and peak intensity (open circles) at 1 1 0 in ordered state.