# Magnetic structures of PrA2Mn2O7 (A=Ca, Sr)

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Although the competition between the A- and the CE-type antiferromagnetic (AFM) phase is reported for LaSr2Mn2O7[1], purely CE-type AFM phase is not reported so far in the half-doped bilayer manganites system. We have investigated magnetic structures of PrCa2Mn2O7 and PrSr2Mn2O7. Single crystals of PrCa2Mn2O7 (with twin structures because of the orthorhombic distortion) and PrSr2Mn2O7 were prepared by a floating-zone method. Neutron scattering measurements were carried out on the triple axis spectrometer GP-TAS in the JRR-3M. We measured on the pseudo-tetragonal (hhl) reciprocal zone for PrCa2Mn2O7 and the (h0l) reciprocal zone for PrSr2Mn2O7.

Figure 1(a) shows the temperature dependence of the bulk magnetization measured by a SQUID magnetometer and the peak intensity at Q=(1/4, 1/4, 3), which is corresponding to a measure of the order parameter of CE-type AFM. With decreasing the temperature, the peak intensity at Q=(1/4, 1/4, 3) increases monotonically below T_N=143 K, while that at the Q=(0, 0, 3) (characteristic of the A-type AFM) is negligibly small (not shown). On the other hand, the monotonic increase of the peak intensity at the Q=(0, 0, 3) with decreasing temperature is observed for PrSr2Mn2O7 (See Fig. 1(b)).

These results indicate that the magnetic structure of PrCa2Mn2O7 is the CE-type AFM down to the lowest temperature, while that of PrSr2Mn2O7 is the A-type AFM, similarly to the case of NdSr2Mn2O7[2][3].

[1] M. Kubota et al., J. Phys. Soc. Jpn. 68, 2202 (1999).
[2] P.D. Battle et al., Phys. Rev. B 54, 15967 (1996).
[3] Y. Moritomo et al., J. Phys. Soc. Jpn. 68, 631 (1999).

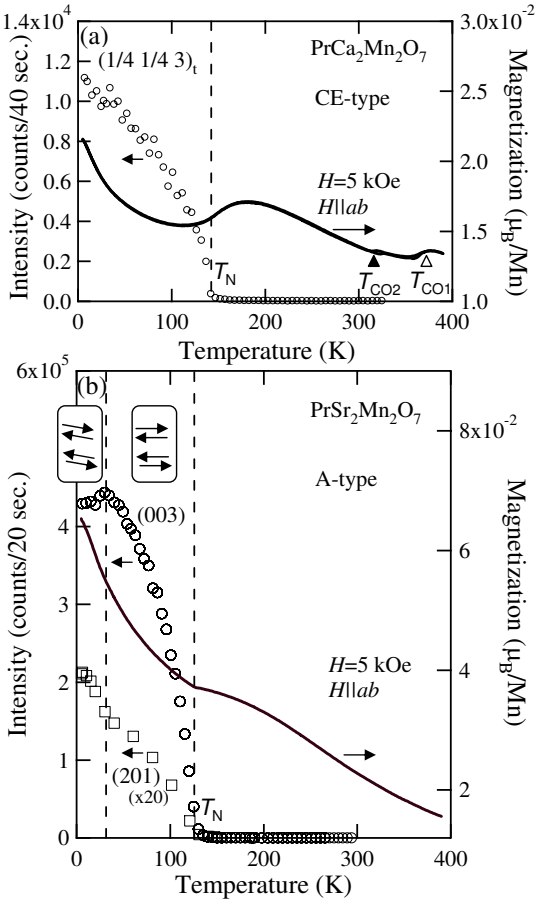


Fig. 1. Temperature dependence of in-plane components of the bulk magnetization and peak intensities at selected positions for (a)PrCa2Mn2O7 and (b)PrSr2Mn2O7.