Magnetic and crystal structures of the ferromagnetic phase in $Sr_3YCo_4O_{10.5}$

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Cobalt oxides have attracted much interest because of a variety of physical properties associated with the spin state degree of freedom. The oxygen-deficient perovskite $Sr_3YCo_4O_{10.5}$ exhibits ferromagnetic order with the highest T_C (~ 370 K) among cobalt-perovskites (Fig.1) [1]. To elucidate the origin of the high temperature ferromagnetism, neutron powder diffraction and the synchrotron x-ray diffraction experiments were carried out.

Synchrotron x-ray diffraction patterns were collected at BL-4B2 of Photon Factory in KEK. Neutorn powder diffraction experiments were performed on the high resolution diffractometer SuperHRPD at BL8 in MLF/J-PARC. At room temperature, superlattice reflections with $4\sqrt{2}\ a_p \times 2\sqrt{2}\ a_p \times 4\ a_p$, where a_p is the lattice parameter of the primitive perovskite unit cell, were observed as already reported [2,3]. In addition, peak splitting was found, suggesting a break in monoclinic symmetry. In this presentation, we will show the result of fitting magnetic structure models to powder diffraction data.

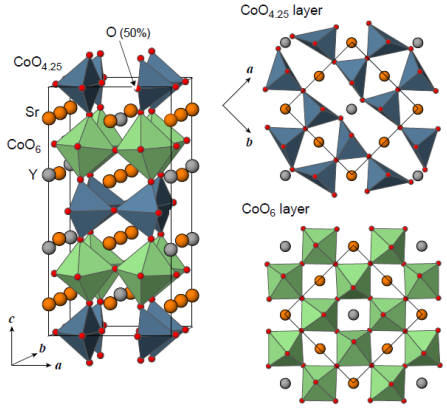

Fig. 1 The oxygen-deficient perovskite structure of $Sr_3YCo_4O_{10.5}$.

References

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