

Magnetic Behavior and Crystal Structure of One-Dimensional Quantum Spin System $\text{Li}_2\text{ZrCuO}_4$

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Magnetic properties and crystal structure have been studied for quasi one-dimensional spin 1/2 system $\text{Li}_2\text{ZrCuO}_4$ with CuO_2 ribbon chains which are formed of edge-sharing CuO_4 square planes. Due to the geometrical characteristic of the crystal structure of CuO_2 ribbon chains, the nearest-neighbor exchange interaction J_1 between spins is ferromagnetic, and the second neighbor interaction J_2 is antiferromagnetic. Under these situations, if the spin system exhibits the magnetic transition, the system has often helical magnetic structure, and is often accompanied with ferroelectricity called multiferroic. We have found that LiVCuO_4 and $\text{PbCuSO}_4(\text{OH})_2$ with the CuO_2 ribbon chains have the helical magnetic structure and multiferroic behavior [1,2]. On the other hand, $\text{Li}_2\text{ZrCuO}_4$ is not accompanied with ferroelectricity at magnetic transition temperature [3]. Here, the powder neutron diffraction measurements have been carried out for $\text{Li}_2\text{ZrCuO}_4$ using the neutron diffraction device (iMATERIA) installed at MLF in J-PARC and the high resolution powder diffractometer (HRPD) installed at JRR-3 in Tokai. The analyzed results of the magnetic structure and detailed crystal structure of $\text{Li}_2\text{ZrCuO}_4$ are presented. On the bases of the obtained data, reasons of no appearance of ferroelectricity are discussed.

[1] Y. Naito *et al.*: J. Phys. Soc. Jpn. **76** (2007) 023708. [2] Y. Yasui *et al.*: J. Phys. Soc. Jpn. **80** (2011) 033707. [3] Y. Tarui *et al.*: J. Phys. Soc. Jpn. **77** (2008) 043703.