Two Phase Transitions in the Low-dimensional Quantum Spin System TiOBr

Jun Akimitsu^a, T. Sasaki^a, M. Mizumaki^b, K. Kato^{b,c}, M, Takata^{b,c}, T. Nagai^d, T. Asaka^d, Y. Matsui^d, ^aDept. of physics and mathematics, ^aAoyama-Gakuin University. ^bJASRI/Spring-8. ^cCREST,JST ^dHVEMS/NIMS. E-mail: jun@phys.aoyama.ac.jp

Recently, Seidel *et al.* [1] suggested from the susceptibility measurements and LDA(+U) calculation that the new inorganic compound TiOX (X=Cl, Br) is a possible candidate for the new spin-Peierls system. However, nobody can observe the new superlattice reflection originated from the spin-Peierls transition.

We report here on the lattice distortion in the new quasi-onedimensional spin system TiOBr by x-ray [2] and electron diffractions. Superlattice reflections were observed mainly at around (h, k+1/2, 0)which implies the dimerization along *b*-axis. The temperature dependence of superlattice reflections shows the two successive phase transitions, a second order transition at T_{c2} =47K and a first order transition at T_{c1} =27K. We will discuss on the key roles of the two successive phase transition of this system.

[1] Seidel A., et al., *Phy. Rev.* B, 2003, **67**, 020405(R). [2] Sasaki T., et al., *Cond-Mat*, 0501691.

Keywords:spin-peierls, superlattice reflection, phase transition