Poster Presentation

MS10.P11

Transition between two Kosterlitz-Thouless phases in Sc-doped TiOCl

J. Zhang[1], A. Wolfel[1], M. Bykov[1], A. Schonleber[1], S. Van Smaalen[1], R. Kremer[2], H. Williamson[2]

[1]University of Bayreuth, Laboratory of Crystallography, Bayreuth, Germany, [2]MPI for Solid State Research, Stuttgart, Germany

The compound TiOCl is a quasi-1-dimensional (1D) quantum magnet (Seidel et al., 2003). Upon cooling, TiOCl undergoes a phase transition at Tc2 = 90 K towards a state with incommensurate magnetic order, followed by a second phase transition at Tc1 = 67 K towards a spin-Peierls state (Seidel et al., 2003; Shaz et al., 2005; van Smaalen et al., 2005). Both low-temperature phases involve structural distortions that have been characterized by x-ray diffraction. The absence of any phase transitions has been reported for scandium-doped TiOCl with doping levels $0.01 < x < 0.1$ for ScxTi1-xOCl (Glancy et al., 2008, 2010; Zhang et al., 2010; Aczel et al., 2011). We have synthesized ScxTi1-xOCl for x = 0.005. Based on temperature-dependent x-ray diffraction experiments and specific-hear measurements, we have found that the x = 0.005 compound transforms into incommensurate and spin-Peierls-like phases on cooling. Despite apparent large correlation lengths, these phases lack long-range order. A sluggish transformation is thus found between states of ScxTi1-xOCl that support different kinds of fluctuations.

[1] *A. Seidel, C. Marianetti, F. Chou et al., Phys. Rev. B, 2003, 67, 020405,* ***[2]*** *M. Shaz, S. van Smaalen, L. Palatinus et al., Phys. Rev. B, 2005, 71, 100405,* ***[3]*** *J. Clancy, B. Gaulin, J. Castellan et al., Phys. Rev. B, 2008, 78, 014433*

Keywords: magnetic order, spin-Peierls, phase transition