Nesting features and the superconducting mechanism in Ce(Co,Rh)In5

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Heavy-fermion superconductor CeMIn5 (M=Co, Rh, Ir, tetragonal structure, space group P4/mmm) has been studied to understand relationship between the magnetism and the unconventional superconductivity. Neutron experiments revealed that CeCoIn5 (Tc ˜ 2.3 K) shows a resonance peak at (1/2 1/2 1/2) [1], and CeRhIn5 (TN ˜ 4K) has an incommensurate magnetic order with a propagation vector of q = (1/2, 1/2, 0.297) [2]. Mixed crystal CeRh1-xCoxIn5 in the middle x region possesses a commensurate magnetic order with the q = (1/2 1/2 1/2), and this requests that the superconductivity realized in the middle x region uses a different fermi surface if they use and that the resonance peak should move to some other q position.

To check the q position of the resonance peak in CeRh1-xCoxIn5 with the middle x region, we carried out an inelastic neutron scattering experiment. For this experiment, we prepared a co-aligned mosaic of the single crystals of CeRh0.6Co0.4In5 with the total volume ˜ 3 g with (h h l)-scattering plane because we expected that resonance peak would appear in q = (1/2, 1/2, l). Neutrons with Ei = 3.8 meV and Fermi chopper speed 240 Hz were used.We measured scattering data at 0.3 K, 2 K, 5 K, 50 K which correspond to the SC + AFM phase, tne AFM phase, normal phase, nomal phase at high temperature using for background, respectively. We are now analyzing data carefully.

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References

[1] C. Stock et al., Phys. Rev. Lett. 100, 087001 (2008).
[2] W. Bao et al., Phys. Rev. B 62 (2000) R14621; Phys. Rev. B 67 (2003) 099903(E).

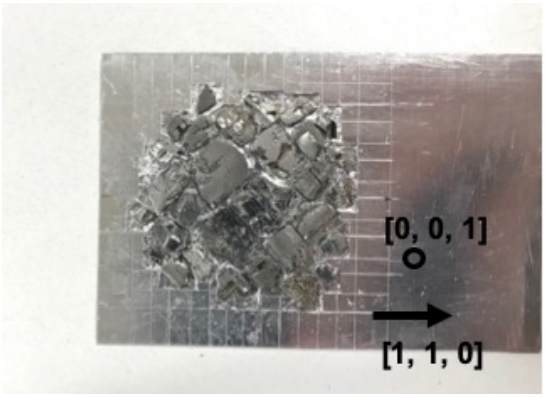

Fig. 1. Fig1. Co-aligned single crystals of CeRh0.6Co0.4In5