Magnetic structure study of the multi-step metamagnet CeIr3Si2

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CeIr3Si2 crystallizes in the orthorhombic ErRh3Si2-type structure (Imma, No. 74). The lattice parameters are a=7.1765 Å, b=9.7274 Å and c=5.5971 Å. The results of electrical resistivity, specific heat and magnetic susceptibility measurements reveal that CeIr3Si2 is a Kondo-lattice compound showing two successive magnetic transitions at 4.1 K and 3.3 K. Below 3.3 K, the isothermal magnetization of polycrystalline sample displays four-step metamagnetic transitions at 0.6 T, 0.9 T, 1.2 T and 1.43 T. It should be needed to obtain the magnetic structures between each transition field in order to study the origin of multi-step metamagnetism of CeIr3Si2. We have been performing the elastic neutron scattering of powder sample and single-crystal one.

At first, we measured the powder neutron diffraction at 300 K, 10 K, 3.7 K and 1.5 K under 0 T. The powder pattern at 300 K agrees with the orthorhombic ErRh3Si2-type structure as shown in Fig.1(a). At 1.5 K, we observed a possible magnetic Bragg peak at 2θ=25.8 degree as shown in Fig.1(b).

We also made a measurement using a single crystal sample. No magnetic reflections have been observed on the principal indices at 0.7 K. Therefore, we will perform further measurements including non-integer indices.