

Substitution studies and the dual nature of 5f electrons in β -UB₂C

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We have recently studied fundamental properties of β -UB₂C [1,2] and it was found that this compound enters a ferromagnetic state below $T_C = 74.5$ K. In addition to the ferromagnetic transition, a characteristic temperature $T^* \simeq 37$ K was found, at which both the electrical resistivity, specific heat and muon relaxation rate show anomalies. Interestingly, T_c and T^* decrease with increasing applied pressure and both are expected to reach 0 K at a critical pressure above 20 kbar [3,4]. In this contribution, we would like to investigate the effects of Th substitution for U on dual nature of 5f electrons in β -UB₂C. Therefore, we measured magnetization, specific heat and electrical resistivity on several alloys within the solid solution Th_xU_{1-x}B₂C. We will show that the long-range ferromagnetic order exists in the solid solution with $x \leq 0.34$. Above this concentration, Th_xU_{1-x}B₂C show an enhancement of the electronic specific heat coefficient and effective magnetic moment, compared to the parent β -UB₂C compound.

References

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13.4 cm

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9.7 cm