Abstract

Motivation of this thesis is a study of magnetic phase diagram of the pseudoternary system $UCo_xRu_{1-x}Al$. Three single crystals $UCo_{0.19}Ru_{0.81}Al$, $UCo_{0.27}Ru_{0.73}Al$ and $UCo_{0.40}Ru_{0.60}Al$ have been successfully prepared by Czochralski method. Composition was confirmed by EDX analysis and quality of single crystals was checked by Laue method. Crystallographic parameters and occupancies were determined by X-ray powder diffraction. Data analysis confirmed strong uniaxial magnetocrystalline anisotropy (c is the easy magnetization axis) and existence of hard and soft ferromagnetic phase. Curie temperature $T_C = 41$ K was determined for $UCo_{0.40}Ru_{0.60}Al$ and phase transition from the soft ferromagnetic phase to the hard one takes place at 35 K. $UCo_{0.27}Ru_{0.73}Al$ becomes ferromagnetic at $T_C = 18$ K and the transition from the soft to the hard ferromagnetic phase takes place somewhere around 7 K. $UCo_{0.19}Ru_{0.81}Al$ is paramagnetic down to 2 K. Analysis of the temperature dependence of resistivity and heat capacity reveals signatures of non-Fermi liquid behaviour due to proximity of quantum critical point.