

Title: Critical behavior in magnetic phase diagrams of uranium compounds

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Abstract:

This work is focused on study of phase diagrams and related critical effects in the pseudoternary $\text{UCo}_{1-x}\text{Ru}_x\text{Al}$ compound. Three single crystals of nominal composition $\text{UCo}_{0.99}\text{Ru}_{0.01}\text{Al}$, $\text{UCo}_{0.995}\text{Ru}_{0.005}\text{Al}$ and $\text{UCo}_{0.9975}\text{Ru}_{0.0025}\text{Al}$ have been prepared by Czochralski method in triarc furnace. Quality of single crystals was checked by EDX analysis, Laue method and XRPD. For $\text{UCo}_{0.99}\text{Ru}_{0.01}\text{Al}$ Curie temperature was determined as $T_C = 16$ K. $\text{UCo}_{0.995}\text{Ru}_{0.005}\text{Al}$ shows transition from paramagnetic to ferromagnetic phase at $T_C = 4.5$ K and at higher temperatures we observe a metamagnetic transition of first order with a critical field $H_C = 0.04$ T. $\text{UCo}_{0.9975}\text{Ru}_{0.0025}\text{Al}$ is paramagnetic to low temperatures with metamagnetic transition of first order and critical field $H_C = 0.55$ T. Experiments in hydrostatic pressure on $\text{UCo}_{0.995}\text{Ru}_{0.005}\text{Al}$ and $\text{UCo}_{0.9975}\text{Ru}_{0.0025}\text{Al}$ showed decay of ferromagnetism and increase of critical field. This behavior is similar to evolution of magnetism in UCoAl and URhAl in applied hydrostatic pressure.

Keywords:

UCoAl , URuAl , ferromagnetism, metamagnetism