MAGNETIC PROPERTIES OF NON–STOICHIOMETRIC $U_{1+x}Ni_{1+y}Al$ COMPOUNDS

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UNiAl (hexagonal ZrNiAl crystal structure) is antiferromagnetic (AF) below T_N =19 K. In magnetic fields above the metamagnetic transition (B_c = 11.25 T at T = 4.2 K) the AF coupling is destroyed yielding magnetization μ = 0.8 μ_B/f.u.. However it is well known that the crystallographic as well as electronic structure of all UTX compounds are sensitive to external perturbations such as temperature, pressure, magnetic field and very important is also the influence of the local surroundings of U atoms. The deviation from the stoichiometry can also be gainfully employed to probe the structural and magnetic instabilities of the U–based intermetallic compounds. The purpose of this work is, therefore, to investigate accurately the effect of variations in stoichiometry on the basic magnetic properties of $U_{1+x}Ni_{1+y}Al$, where x $\leq$ 0.04 and y $\leq$ 0.06. The samples were prepared by arc–melting in protective Ar–atmosphere. Phase purity, crystal structure and lattice constants were checked by standard X–ray diffraction methods. Metallographic examination showed the presence of small amount (less then 3 %) of a parasitic phase in the form of intergranular networks. Magnetization measurements were carried out by VSM magnetometer in the temperature range 4.2 K $\leq T \leq$ 300 K in applied magnetic field up to μ_0H = 6 T. Obtained results have shown that the transition temperature T_N of investigated compounds is directly proportional to x and y.

9.7 cm

13.4 cm

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