

Title: Consequences of applying the hydrostatic pressure on the structural jump in RTAl compounds

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Abstract: This bachelor thesis investigates the effects of hydrostatic pressure on structural transition in GdNiAl compound (ZrNiAl-type of structure), which have not been studied yet. This structural transformation represents an existence of a range of forbidden values of the lattice parameters ratio c/a , which cannot be adopted by compounds crystallizing in this type of structure. It prefers rather a step-like change of the parameters a and c . An anomalous behavior of resistivity, which appears in the area of the transition, was used for the structural transition determination. The results are accompanied by measurements of electrical resistivity at ambient pressure. Measurements on a polycrystalline sample suggested an anomalous behavior depicting the pressure dependence of the structural transition temperature. The pressure evolution of the structural transition temperature of a virgin sample is decreasing, being a consequence of higher sensitivity of the lattice constant c . Repeating the same experiment on the same piece of sample – i.e. sample with the transition history – provided opposite trend. Main result of this thesis is the phase diagram of structural transition, which can support an explanation of this abnormal behavior, in connection with further planned measurement on a monocrystalline sample.

Keywords: GdNiAl, structural discontinuity, phase diagram, hydrostatic pressure