

Title: Ultrapure metallic materials
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Abstract

This thesis deals with crystal structure and magnetic properties of RCr_2Si_2 ($\text{R} = \text{Pr}, \text{Tb}, \text{Er}$) and $\text{RCr}_2\text{Si}_2\text{C}$ ($\text{R} = \text{La}, \text{Ce}, \text{Pr}, \text{Nd}$) compounds. All prepared samples were characterized by powder X-ray diffraction and investigated by specific-heat, magnetization and AC-susceptibility measurements in the temperature range 2–900 K and in magnetic fields up to 9 T. The results suggest non-trivial magnetic ordering of the Cr sublattice in all studied compounds, accompanied with ferromagnetic ordering of the Pr and Nd magnetic moments below the Curie temperature of 30 and 21 K in $\text{PrCr}_2\text{Si}_2\text{C}$ and $\text{NdCr}_2\text{Si}_2\text{C}$, respectively, and possible metamagnetism in $\text{CeCr}_2\text{Si}_2\text{C}$. For $\text{RCr}_2\text{Si}_2\text{C}$ compounds, the experimental evidence of Cr magnetism is corroborated by results of extended first-principles calculations based on the density functional theory.

Keywords: RCr_2Si_2 compounds; $\text{RCr}_2\text{Si}_2\text{C}$ compounds; Magnetic ordering; Heat capacity; Magnetization