

Complex magnetic properties of RE₅T₂In₄ (RE = Gd-Tm; T = Ni, Rh, Pd, Pt) intermetallics

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The RE₅T₂In₄ (RE = Gd-Tm; T = Ni, Rh, Pd, Pt) intermetallics crystallize with the orthorhombic Lu₅Ni₂In₄-type structure (space group *Pbam*, No. 55), which was for the first time reported by Zaremba et al. [1]. Crystal structure parameters can be found in: [1] (T = Ni), [2] (T = Rh), [3] (T = Pd) and [4] (T = Pt). The structure is a layered one with layers formed by the rare earth atoms separated by the layers formed by the two remaining elements. The magnetic properties of RE₅T₂In₄, including magnetocaloric performance and/or magnetic structures for selected compounds, have been reported in a number of papers, namely: [5] (T = Ni), [6] (T = Pd) and [7] (T = Pt). In this presentation new data for the Rh-based compounds are also included [8]. In the Lu₅Ni₂In₄-type crystal structure, the rare earth atoms occupy three non-equivalent Wyckoff sites, namely, the 2a site (0,0,0) and two 4g sites (*x*,*y*,0) with individual *x* and *y* atomic positional parameters. Such a distribution of the magnetic atoms leads to competition of different magnetic interactions, resulting in appearance of complex magnetic properties, like: coexistence of ferro- and antiferromagnetic components of the magnetic structure, different propagations vectors describing magnetic order in different magnetic sublattices, temperature- and/or magnetic field-induced magnetic transitions of the order-order type, individual critical temperatures of magnetic ordering for individual magnetic sublattices.

In this presentation, the magnetic properties of RE₅T₂In₄ [5-7], including the new data for Rh-based compounds [8], are discussed and summarized with special attention paid to thermal evolution of the magnetic order and magnetocaloric performance.

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[7] Hayyu, A. R., Baran, S., Szytuła, A., Berent, K., Deptuch, A. (2024) *Journal of Alloys and Compounds* **1001** 175054, and references therein.

[8] Hayyu, A. R., Baran, S., Deptuch, A., Szytuła, A. to be submitted to arXiv.

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