# Magnetic properties of TbNi$_{1-x}$Au$_x$In compounds

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The work reports magnetic and neutron diffraction data of the pseudoternary TbNi$_{1-x}$Au$_x$In compounds for $0 < x < 1$. All these compounds crystallize in the ZrNiAl-type hexagonal structure. The hexagonal arrangement of rare earth atoms introduces geometrical frustration in case of antiferromagnetic coupling. The ternary TbNiIn and TbAuIn compounds are isostructural but have different magnetic ordering. In TbNiIn the magnetic order is described by the propagation vector $\mathbf{k} = [\frac{1}{2}, 0, \frac{1}{2}]$ while in TbAuIn by $\mathbf{k} = [0, 0, \frac{1}{2}]$. In both compounds the Tb magnetic moments form a noncollinear 120$^o$-type structure. In TbNiIn a change of magnetic order at 32 K is observed. The solid solutions TbNi$_{1-x}$Au$_x$In exist for all $x$ values. Magnetic data indicate that the Néel temperature decreases with increasing $x$ from 68 K for $x = 0$ to 35 K for $x = 1$. For the sample with $x > 0.5$ an additional phase transition below $T_N$ at $T_t$ is also observed. The values of $T_t$ decrease with increasing $x$. Neutron diffraction data for $x > 0.5$ indicate magnetic ordering described by the propagation vector $\mathbf{k} = [\frac{1}{2}, 0, \frac{1}{2}]$. The obtained data are discussed in the XY model including interactions between nearest and next-nearest magnetic moments.

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