The magnetic properties and crystal structure of the GdMnGe intermetallic compound

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The magnetic properties of the GdMnGe intermetallic compound has been investigated by magnetization and susceptibility measurements. The GdMnGe alloy was prepared by arc-melting from commercially available high purity elements. The X-ray phase analysis and the metallographic analysis were employed in the research of crystal structure of this compound. It was found that the GdMnGe intermetallic compound crystallizes in the orthorhombic TiNiSi-type structure. The magnetization measurements were carried out in magnetic fields up to 1.2 T at temperatures from 78 K to 700 K using a pendulum magnetometer, and in magnetic fields up to 14 T at low temperatures from 4.2 K using superconducting solenoid. The susceptibility measurements were carried out on a "Cahn-1000" electrobalance in field up to 4.28 kOe and in the temperature range 4.2-300 K. The GdMnGe sample demonstrates antiferromagnetic ordering with the Neel temperature $T_{\mathrm{N}} = 95$ K. It is known, that the Mn-Mn coupling becomes antiferromagnetic in manganese rare-earth compounds at $\mathrm{d}_{\mathrm{Mn-Mn}} > 2.89$ A. The antiferromagnetism of GdMnGe ($\mathrm{d}_{\mathrm{Mn-Mn}} = 3.103$ A) is correlated with Mn-Mn distances. The spontaneous magnetic moment was not discovered in the GdMnGe sample.

9.7 cm

13.4 cm

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