ELECTRONIC STRUCTURE AND MAGNETISM OF $GdTi_{1-x}Mn_xGe$.

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9.7 cm

RTX germanides like GdTiGe and $GdTi_{1-x}Mn_xGe$ have particularly interesting magnetic and crystallographic properties. For GdTiGe various types of crystal structure and magnetic ordering have been reported. We have found that polycrystalline compounds $GdTi_{1-x}Mn_xGe$ crystallize in the tetragonal CeScSi type of structure (I4/mmm) for $x \leq 0.7$. The crystal structure has been refind using the Rietveld method. The temperature dependence of magnetic susceptibility and electrical resistivity have been measured for $GdTi_{1-x}Mn_xGe$. GdTiGe exhibits ferromagnetic ordering at 374 K. It is noteworthy that the temperature of the transistion is very high for a rare-earth compound with non-magnetic metals. The electronic structure of the series of compounds has been investigated with use of photoelectron spectroscopy (XPS and UPS). The electronic structure of GdTiGe determined from the photoemission spectra has been found to be in good agreement with the calculations performed with the TB-LMTO method. The calculations indicate to the polarization of the d-bands as a main source of the high magnetic ordering temperature, due to the indirect exchange via the d-band. Substitution of Ti by Mn does not lead to the substantial crystallographic changes. The electronic structure and temperature of magnetic ordering also show relatively small variation with increasing Mn content.

13.4 cm

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