VARIATION OF MAGNETIC PROPERTIES AS FUNCTION OF COMPOZITION IN THE $Gd(Fe_{1-x}Al_x)_{11}TiC_{1-\delta}$ AND $Gd(Fe_{1-x}Al_x)_{10}V_2C_{1-\delta}$ SERIES

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Some magnetic properties of the $Gd(Fe_{1-x}Al_x)_{11}TiC_y$ and $Gd(Fe_{1-x}Al_x)_{10}V_2C_y$ alloys (with x=0; 0,1; 0,2 and y=0 and 1 for x = 0,2) have been investigated using a Faraday magnetic balance in the 80-1100 K temperature range and in an external magnetic field up to 1T. The alloys with nominal compozition have been prepared by arc melting method and annealed for several days at 1000 °C. The structure and termomagnetic analyze show that the alloys are predominantly formed by 1:12 ordered phase ($ThMn_{12}$ type structure), but low concentrations of the disordered α-Fe phase are present. From the starting compounds of the series ($GdFe_{11}Ti$ and $GdFe_{10}V_2$) the Curie temperature is 604 K and 628 K, respectively. It is found that the Curie temperature, the saturation magnetization and the magnetic anisotropy at room temperature of the 1:12 intermetallic compounds decrease with the increase of Al content, but clearly increase by the insertion of the interstitial carbon atoms in the $Gd(Fe_{0.8}Al_{0.2})_{11}TiC_{1-\delta}$ and $Gd(Fe_{0.8}Al_{0.2})_{10}V_2C_{1-\delta}$ compounds. For exemple, Curie temperature decreases with Al content up to 470 K and 376 K and increase by C-atoms insertion at 504 K and 512 K respectively. The experimental data were interpreted in terms of the exchange interactions theory.

9.7 cm

13.4 cm

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