ELECTRONIC STRUCTURE AND MAGNETIC PROPERTIES OF $Fe_2V_{1-x}Ti_xAl$

Andrzej Ślebarski, Łukasz Skoczeń and Jerzy Goraus
Institute of Physics, University of Silesia, 40-007 Katowice, Poland

9.7 cm

Recent transport, specific heat and magnetic susceptibility measurements indicated that the Heusler-type Fe_2VAl compound is a candidate for a 3d heavy-fermion system [1]. Experimental investigations have shown the large (compared to the normal metal) value of the low-temperature electronic specific heat coefficient γ and the semiconductor-like behavior of the resistivity in the paramagnetic state. Therefore, Fe_2VAl has been classified to the non-magnetic narrow-gap semiconductors (Kondo insulators) having similar properties as FeSi [2]. Another compound, Fe_2TiAl is weakly ferromagnetic [3], $T_C \cong 120$ K in agreement to the Slater-Pauling behavior [4], however, its magnetic moment at $T = 0$ is much smaller than expected.

In this presentation we discuss the results of our electronic structure investigations (XPS experimental results and LMTO calculations of the valence bands) for $FeV_{1-x}Ti_xAl$ series of alloys. We also present the magnetic susceptibility measurements of $FeV_{1-x}Ti_xAl$. We try to understand the ground state properties of these alloys basing on the atomic disorder, which leads to the formation of the magnetic clusters.

[1] Y. Nishino et al., Phys. Rev. Lett. **79**, 1909 (1997).
[2] Z. Schlesinger et al., Phys. Rev. Lett. **71**, 1748 (1993).
[3] K.H.J. Buschow and P.G. Engen, J. Magn. Magn. Mater., **25**, 90 (1981).
[4] I. Galanakis et al., **66**, 174429 (2002).

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Corresponding author :
J. Goraus

Address for correspondence :
Instytut Fizyki
Uniwersytet Ślaski
40-007 Katowice

Email address :
slebar@us.edu.pl