Magnetic and electronic properties of $Ho(Co_{1-x}Fe_x)_2$ system

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Results of measurements of the magnetic susceptibility, the electrical resistivity, the crystal and electronic structures of the polycrystalline intermetallic compounds $Ho(Co_{1-x}Fe_x)_2$ are presented. The effect of the partial substitution Co by Fe reflects in an increase of the lattice parameters and the Curie temperature $T_C(x)$. The first order phase transition which is observed in $HoCo_2$, reflected in an almost discontinuous change in the resistivity at T_C and with a double peak structure of the magnetic susceptibility $\chi_{AC}(T)$ (Fig. 1), switches to the transition of the second order upon the substitution of 3% of Co by iron atoms. The electronic structure of the investigated system was studied by using X-ray photoemission spectroscopy (XPS). The obtained results show that the valence bands are dominated mainly by the Ho *4f* and hybridised Fe/Co *3d* states. The position and shape of the *3d* bands depends clearly on the composition.

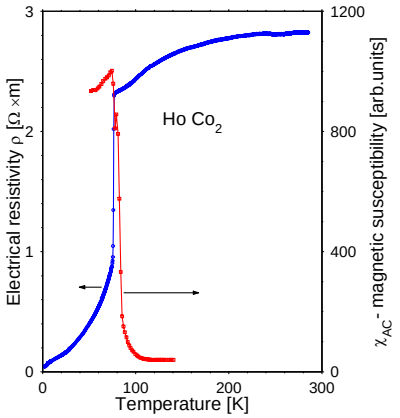

Fig. 1. Electrical resistivity and magnetic susceptibility of the $HoCo_2$ compound

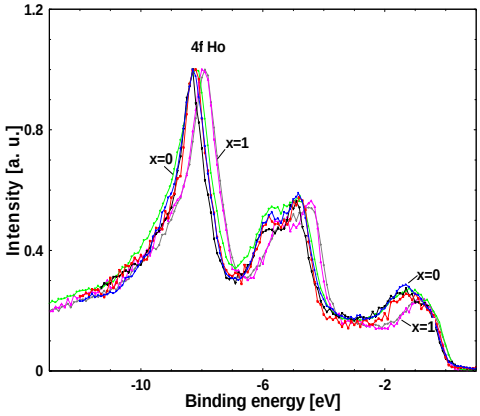

Fig. 2. The XPS valence band spectra for $Ho(Fe_{1-x}Co_x)_2$ system

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