Photoemission study of $CeRh_{1-x}Pd_xAl$; effect of Pd doping on the electronic structure

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CePdAl is known as an antiferromagnetic heavy fermion compound [1]. The temperature dependence of the resistivity shows the Kondo behavior and the γ-coefficient of the specific heat ($\gamma \equiv C/T$) is ~270 mJ/molK^2 below Néel temperature T_N which is 2.7 K. CeRdAl crystallizes in hexagonal structure of ZrNiAl-type [2].
Another ternary intermetallic compound, CeRhAl, crystallizes in the orthorhombic $Pd_2(Pd,Mn)Ge_2$-type structure and is antiferromagnet below $T_N = 3.7$ K [3]. At $T > T_N$ CeRhAl exhibits a non-Fermi liquid character of the temperature dependence for low-T physical properties [3].

In view of the contrasting behavior of the Pd-containing and Rh-containing systems, we investigate the solid solutions $CeRh_{1-x}Pd_xAl$ to determine the dependence of the electronic properties on the number of the conduction electrons. We present the structural and x-ray photoemission spectroscopy (XPS) data for $CeRh_{1-x}Pd_xAl$. We discuss the influence of the number of free electrons in the conduction band on the stability of the crystallographic structure and the occupation number of the f-shell.

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