Electronic structure of RAg_2Ge_2 ($R = Pr$, Nd) compounds

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9.7 cm

The electronic structure of ternary RAg_2Ge_2 ($R = Pr$, Nd) compounds, which crystallize in the tetragonal $ThCr_2Si_2$ - type structure, were studied by X-ray photoemission spectroscopy. The magnetic data indicate that $PrAg_2Ge_2$ remains paramagnetic down to 1.9 K, whereas $NdAg_2Ge_2$ orders antiferromagnetically at about 2 K. The XPS results clearly show that the valence bands in both germanides consist mainly of the Ag $4d$ band. The XPS spectra of Pr and Nd $3d_{5/2}$ and $3d_{3/2}$ core levels were analyzed in the framework of the Gunnarsson-Schönhammer model [1] in order to derive information on the hybridization of $4f$ orbital with the conduction band. Separation of the XPS peaks, based on the Doniach-Šunjić theory [2], yielded the ratio $r = I(f^{n+1})/[I(f^n) + I(f^{n+1})]$ being equal to 0.09 for $PrAg_2Ge_2$ and 0.17 for $NdAg_2Ge_2$, which corresponds to the hybridization energy of 58.1 and 84.4 eV, respectively. The obtained values indicate a stability of the $4f$ shell in these two compounds, in good agreement with the magnetic data.

[1] O. Gunnarson, K. Schönhammer, Phys. Rev. B, **28** (1983) 4315.

[2] S. Doniach, M. Šunjić, J. Phys. C, **3** (1970) 285.

13.4 cm

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