Electronic structure of RCuIn and R_2CuIn_3 (R = La, Ce, Pr) compounds

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The electronic structure of the ternary RCuIn and R_2CuIn_3 (R = La, Ce, Pr) compounds was studied by X-ray photoelectron spectroscopy method. The valence bands and the XPS core levels were investigated. The two families of compounds crystallize in different hexgonal crystal structures: ZrNiAl-type for RCuIn and AlB_2-type for R_2CuIn_3. Analysis of the XPS valence band data indicate that the valence bands are mainly determinated by the Cu*3d* band. The analysis of the Ce*3d* spectra on the basis of the Gunnarsson-Schönhammer model gives the hybridization of the 4f electrons with the conduction band equal 45 meV for CeCuIn and 140 meV for Ce_2CuIn_3. The appearance of the $3d^94f^0$ component is a clear evidence of the intermediate valence behavior for cerium. The *4f* occupation number is 0.95 for CeCuIn and 0.92 for Ce_2CuIn_3. The analysis of the other core levels confirms a small influence of the atomic surrounding on the electronic structure.

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