Electronic structure of $Ce_2Rh_3Al_9$

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$Ce_2Rh_3Al_9$ is an interesting compound, known to possess mixed valence properties and unusual temperature dependence of resistivity [1]. We have measured specific heat, electrical resistivity, magnetical susceptibility and the x-ray photoemission spectroscopy (XPS) spectra of that compound. Moreover, we calculated the density of states (DOS) by means of FP-LAPW and TB-LMTO-ASA method.
FP-LAPW predicts half-metallic character, whereas TB-LMTO predicts nonmagnetic ground state with the gap of about 3meV located in the DOS at the Fermi level. However, the low temperature resistivity data do not show the semiconducting-like behavior, probably because of an atomic disorder, which usually removes an insulating gap. Magnetic measurements do not show any ordering down to 2 K, therefore the LMTO calculations seems to depict better the ground state properties of that compound. An agreement between measured valence band spectra and calculated one is also quite good.

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