Specific heat of $YbNi_4Si$ compound

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The specific heat of $YbNi_4Si$ has been analyzed considering the electronic contribution, the Schottky anomaly, and the lattice contributions in frames of the Debye model. The scheme of the energy levels created by the crystal electric field spliting is determined from Schottky contribution to the specific heat. YNi_4Si, isostructural nonmagnetic analog, was used in order to subtract phonon contribution to specific heat by a comparative method. Based on the specific heat measurements, the electronic specific heat coefficient γ=25 $mJmol^{-1}K^{-2}$ and the Debye temperature θ_D =320 K were derived. These studies are completed by magnetic susceptibility and X-ray photoemission spectroscopy measurements. $YbNi_4Si$ is paramagnetic and magnetic susceptibility follows the Curie-Weiss law with μ_{eff}=4.15 μ_B/f.u.. This effective magnetic moment is close to the value expected for the $4f^{13}$ configuration (4.54 μ_B). The Yb^{2+} and Yb^{3+} peaks observed by XPS in the valence band region confirm the domination of the Yb^{3+} valence state. A quadratic dependence of electrical resistivity at low temperatures has been observed.

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