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$YbIr_2Si_2$ - A new Yb-based Heavy Fermion System situated on the Fermi liquid side close to a Quantum critical point

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$YbRh_2Si_2$ (T_N = 70 mK) has been intensively investigated due to its proximity to a quantum critical point (QCP). Magnetic field or negative chemical pressure was used to suppress the weak magnetic order in $YbRh_2Si_2$ and the system can be driven through the QCP. We have investigated high quality single crystals (RRR>200) of the isoelectronic compound $YbIr_2Si_2$. Depending on synthesis condition the crystals take either body-centered (I-type) or primitive (P-type) tetragonal structure. P-type sample shows AF order below 700 mK. I-type $YbIr_2Si_2$ is a heavy fermion system (γ= 0.37 J/mol K^2) and does not show any signature of magnetic or superconducting transition down to 20 mK. Above 500 mK the temperature dependence of resistivity $\rho(T)$ and specific heat is similar to $YbRh_2Si_2$. However, below 400 mK a quadratic decrease of $\rho(T)$ and a constant Sommerfeld coefficient γ evidence Fermi liquid behavior. The absence of magnetic transition and the Fermi liquid behavior in resistivity, specific heat and magnetic susceptibility below 400 mK indicate that I-type $YbIr_2Si_2$ is located on the non-magnetic side of the QCP, in contrast to $YbRh_2Si_2$. Thus, $YbIr_2Si_2$ is suitable to investigate pressure induced quantum phase transition.

Keywords : Quantum critical point, Heavy Fermion, Yb-compounds