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Heavy Fermion Behavior, Crystalline Electric Field Effects, and Weak Ferromagnetism in $SmOs_4Sb_{12}$ W.M. YUHASZ, N.A. FREDERICK, P.-C. HO, N.P. BUTCH, B.J. TAYLOR, T.A. SAYLES, M.B. MAPLE, University of California at San Diego, J.B. BETTS, A.H. LACERDA, NHMFL/LANL, P. ROGL, G. GIESTER, Universität Wien — The filled skutterudite compound $SmOs_4Sb_{12}$ was prepared in single crystal form and characterized. The $SmOs_4Sb_{12}$ crystals have the $LaFe_4P_{12}$-type structure with lattice parameter $a = 9.3085$ Å. Specific heat measurements indicate a large electronic specific heat coefficient of ≈ 880 mJ/mol K^2, from which an enhanced effective mass $m^* \approx 170 m_e$ is estimated. The specific heat data also suggest crystalline electric field (CEF) splitting of the $Sm^{3+} J = 5/2$ multiplet into a Γ_7 doublet ground state and a Γ_8 quartet excited state separated by ~ 37 K. Electrical resistivity ρ(T) measurements reveal a decrease in ρ(T) below ~ 50 K that is consistent with CEF splitting of ~ 33 K between a Γ_7 doublet ground state and Γ_8 quartet excited state. Specific heat and magnetic susceptibility measurements display a possible weak ferromagnetic transition at ~ 2.6 K, which could be an intrinsic property of $SmOs_4Sb_{12}$ or possibly due to an unknown impurity phase. This research was supported by the U.S. DOE (DE-FG02-04ER46105), the NSF (DMR-0335173), and the NEDO International Joint Research Program. Work at the NHMFL-LANL was supported by the NSF, the State of FL and the US DOE.

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