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Investigation of magnetic order in SmTr_2Zn$_{20}$ (Tr = Fe, Co, Ru) and SmTr_2Cd$_{20}$ (Tr = Ni, Pd)[1] DUYGU YAZICI, B. D. WHITE, UC, San Diego, P.-C. HO, California State University, Fresno, N. KANCHANAVATEE, K. HUANG, UC, San Diego, N. R. DILLEY, Quantum Design, M. B. MAPLE, UC, San Diego — Single crystals of the cage compounds SmTr_2Zn$_{20}$ (Tr = Fe, Co, Ru) and SmTr_2Cd$_{20}$ (Tr = Ni, Pd) have been investigated by means of electrical resistivity, magnetization, and specific heat measurements. The compounds $SmFe_2Zn_{20}$, $SmRu_2Zn_{20}$, and $SmNi_2Cd_{20}$ exhibit ferromagnetic order with Curie temperatures of T_C = 47.4 K, 7.6 K, and 7.5 K, respectively, whereas $SmPd_2Cd_{20}$ is an antiferromagnet with a Néel temperature of T_N = 3.4 K. No evidence for magnetic order is observed in $SmCo_2Zn_{20}$ down to 110 mK. The Sommerfeld coefficients γ are found to be 57 mJ/mol-K^2 for $SmFe_2Zn_{20}$, 79.5 mJ/mol-K^2 for $SmCo_2Zn_{20}$, 258 mJ/mol-K^2 for $SmRu_2Zn_{20}$, 165 mJ/mol-K^2 for $SmNi_2Cd_{20}$, and 208 mJ/mol-K^2 for $SmPd_2Cd_{20}$. Enhanced values of Sommerfeld coefficients γ and a quadratic temperature dependence of the electrical resistivity at low temperature for $SmRu_2Zn_{20}$ and $SmPd_2Cd_{20}$ suggest an enhancement of the quasiparticle masses due to hybridization between localized $4f$ and conduction electron states.

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