Abstract Submitted for the MAR05 Meeting of The American Physical Society

Specific Heat of Superconducting HfV₂: Effect of Magnetic Fields J.L. SMITH, F.R. DRYMIOTIS, T. KIMURA, G. LAWES¹, D.J. THOMA, J.C. LASHLEY, Los Alamos Natl Lab, R.A. FISHER, N.E. PHILLIPS, Lawrence Berkeley Natl Lab — Specific-heat (C) measurements on a single crystal of HfV_2 were made from 1 to 300 K in magnetic fields (H) to 14 T along the [110] axis. The HfV_2 has a martensitic transition at $T_M = 118$ K and becomes superconducting (SC) at $T_c \sim 8$ K. The T_c and C vary following repeated cooling cycles through the T_M from room temperature. This variation is probably related to strains or fracturing or both from the cubic-to-orthorhombic transition at T_M . For zero field, $\Delta C(T_c)/\gamma T_c = 2.06$, which indicates strong coupling, and is nearly independent of variations in γ_n , T_c , and C that result from the thermal cycling. The SC state C can be fitted with the alpha model for strongly-coupled superconductors using an energy gap $\Delta(0)/k_BT_c = 2.1$; the associated electron-phonon coupling constant λ = 1.5. Both of these parameters are similar to those of Pb. In the normal state, the Sommerfeld constant (γ_n) depends on the thermal history: for $T_c = 8.0$ K, γ_n = 42.1 mJ K² mol⁻¹ after the first cooling. From fits above T_c , the Debye theta Θ_D , characterizing the low-temperature lattice C is 177 K following the first cooling through T_M .

¹now at Wayne State Univ.

J.L. Smith Los Alamos Natl Lab

Date submitted: 14 Dec 2004

Electronic form version 1.4