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Superconducting and Normal State Properties of OsB_2* YOGESH SINGH, A. NIAZI, X. ZONG, B.J. SUH†, M.W. VANNETTE, R. PROZOROV, D.C. JOHNSTON, Ames Lab. and Dept. Phys. and Astron., Iowa State Univ., Ames, IA 50011 — OsB_2 is a layered superhard metallic material that was found to superconduct below $T_c = 2.1$ K.[1] We report the first detailed measurements of the static and dynamic magnetic susceptibilities χ, electrical resistivity, heat capacity C_p, penetration depth, and ^{11}B NMR on OsB_2 to characterize its superconducting and normal state properties. The results confirm that OsB_2 is a bulk superconductor below $T_c = 2.1$ K. Its properties can be described by a close to weak-coupling s-wave BCS model with an electron-phonon coupling constant $\lambda = 0.4$–0.5, $\Delta(0)/(k_B T_c) \approx 1.9$, a small Ginzburg-Landau parameter κ of order 5 or less, and a small zero-temperature critical magnetic field of roughly 500 Oe. The ^{11}B NMR measurements in the normal state show a nuclear spin-lattice relaxation time $T_1 = 2.1$ s at room temperature and a Korringa law with $T_1 T = 610$ s·K at lower T, and a correspondingly small T-independent Knight shift. These results indicate a small s character of the conduction electron wave function at the B site at the Fermi level. Our results will be compared to corresponding data for MgB_2.
1. J. K. Vandenberg et al., Mater. Res. Bull. **10**, 889 (1975).
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