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Linear magnetoresistance and zero-field anomalies in HfNiSn single crystals[1] LUCIA STEINKE, Texas AM Univ., JEDEDIAH J. KISTNER-MORRIS, HAIMING DENG, GAYLE GESCHWIND, Stony Brook Univ., MEIGAN C. ARONSON, Texas AM Univ. — The Half-Heusler compound HfNiSn is probably best known as a candidate material for thermoelectric applications, and studies of its properties have mainly focused on polycrystalline samples and thin films. However, magnetotransport studies of HfNiSn show unusual transport properties like linear magnetoresistance (LMR) [1], where single-crystalline samples of HfNiSn exhibit unexpected LMR at very low fields. In this work, we optimized the solution growth of HfNiSn to obtain high-quality single crystals, where electrical transport measurements show that it is a compensated semimetal below ≈ 200 K, where the Hall voltage is zero. At higher temperatures, we see a finite Hall contribution from activated excess carriers. In the semimetallic regime, we observe transport anomalies like resistive signals that strongly depend on contact configuration, and LMR below 5 K. Both low-field DC and low frequency AC magntization measurements show pronounced diamagnetic behavior and the onset of paramagnetism below 4 K. High-frequency diamagnetic screening may be attributed to a decreased skin depth with decreased resistance, but this scenario seems unlikely in HfNiSn since the measured resistance increases steeply at the lowest temperatures. [1] K. Ahilan et al., PRB 69, 245116 (2004).

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