Magnetic, Thermal and Transport Properties of LaNi$_2$(Ge$_{1-x}$P$_x$)$_2$ R.J. GOETSCH, V.K. ANAND, ABHISHEK PANDEY, D.C. JOHNSTON, Ames Lab. and Dept. Phys. Astron., Iowa State Univ., Ames, IA 50011 — Polycrystalline samples of LaNi$_2$(Ge$_{1-x}$P$_x$)$_2$ ($x = 0, 0.25, 0.50, 0.75, 1$) with the tetragonal ThCr$_2$Si$_2$ structure were investigated by heat capacity $C_p$, magnetic susceptibility $\chi$, and electrical resistivity $\rho$ measurements for temperatures $1.8 \text{ K} \leq T \leq 300 \text{ K}$. The $\rho(T)$ data for each sample reveal metallic behavior that follows the Bloch-Grüneisen theory. The low-$T$ $C_p(T)$ data for the series yielded Sommerfeld coefficients $\gamma = 6–12 \text{ mJ/mol K}^2$ and Debye temperatures $\Theta_D = 300–480 \text{ K}$. The $\chi(T)$ data showed nearly $T$-independent paramagnetism except for LaNi$_2$Ge$_2$, where data up to 1000 K exhibit a broad peak at $\approx 300 \text{ K}$. A possible onset of superconductivity is seen for LaNi$_2$P$_2$ at 2.1 K. Analytic functions accurately representing the Bloch-Grüneisen and Debye functions are presented that are very useful for fitting $\rho(T)$ and lattice $C_p(T)$ data, respectively.

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