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Sb-doped PbTe: An NMR Perspective E.M. LEVIN, K. SCHMIDT-ROHR, Ames Laboratory DOE and Iowa State University, C.M. JAWORSKI, J.P. HEREMANS, Ohio State University — In PbTe, Sb as a dopant can occupy either Pb or Te sites. To understand the effect of Sb on the local charge-carrier concentration in both cases, we have studied high-resolution ^{125}Te and ^{207}Pb NMR spectra of $Pb_{1-x}Sb_xTe$, $PbSb_xTe_{1-x}$, and n- and p-type PbTe samples. The spectra of $Pb_{0.9975}Sb_{0.0025}Te$ and $PbSb_{0.0025}Te_{0.9975}$ have distinctly different resonance frequencies due to Knight shifts and chemical shifts produced by Sb at Pb or Te sites. $Pb_{0.9975}Sb_{0.0025}Te$ is n-type while in $PbSb_{0.0025}Te_{0.9975}$ both n- and p-type are found. NMR spectra and spin-lattice T_1 relaxation of ^{207}Pb nuclei in $PbSb_{0.0025}Te_{0.9975}$, which are sensitive to the hyperfine interaction between charge carriers and NMR nuclei, reveal at least four components, which reflect electronic inhomogeneity of the sample. The local carrier concentrations estimated from T_1 NMR varies from n <3x10^{17} to $p \sim 10^{19}$ cm^{-3}. These multiple components help rationalize the complex temperature dependence of the thermopower of $PbSb_{0.0025}Te_{0.9975}$. However, comparison with Hall and Seebeck effects data indicates that some NMR signals are due to localized electron states, which do not directly contribute to transport.

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