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Electron Dominated Thermal Transport in (Hf,Zr)N-(Sc,Y)N Superlattices JOSEPH FESER, University of California, Berkeley, MONA ZEBARJADI, Unversity of California, Santa Cruz, JEREMY SCHROEDER, ROBERT WORTMAN, Purdue University, DONGYAN XU, University of California, Berkeley, ALI SHAKOURI, Unversity of California, Santa Cruz, ARUN MAJUMDAR, Advanded Research Projects Agency - Energy, TIMOTHY SANDS, Purdue University — Alloyed metal-semiconductor superlattices composed of (Hf,Zr)N-(Sc,Y)N have been studied as candidate thermoelectric materials because of their potential to simultaneously reduce the lattice thermal conductivity using interface scattering and enhance the thermoelectric power factor using energy-dependent electron filtering. Temperature-dependent thermal conductivity measurements on thin films have been performed using the 3-Omega method between 30K - 800K for various alloy compositions and superlattice spacings in order to provide insight into the phonon and electron transport processes. The results indicate a strong electronic component where the temperature dependence of thermal conductivity is consistent with thermionic emission. We demonstrate that by controlling alloy composition, the barrier height of the resulting Schottky barrier can be controlled. Boltzmann Transport modeling is used to estimate the effective barrier heights.

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