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Thermal conductivity and interfacial thermal conductance of HfN/ScN superlattices BO SUN, Natl Univ of Singapore, JEREMY SCHROEDER, Linkoping University, YEEKAN KOH, Natl Univ of Singapore — Metal/semiconductor superlattices are known for their potential application as thermionic devices. Understanding thermal properties of such superlattices is essential for the design of new material structures and devices. Here, we measured the cross-plane thermal conductivity of HfN/ScN metal/semiconductor superlattices using time-domain thermoreflectance (TDTR). HfN/ScN superlattices with different period thickness (2nm to 24 nm) were grown on MgO substrate using reactive magnetron sputtering. We found that the minimum thermal conductivity is 4.3 W/m K when the period thickness is 6 nm. By changing the ratio of layer thickness of HfN and ScN (1:4 to 4:1), we studied the contributions electrons and phonons to the thermal conductivity of superlattices. Use a simple thermal resistance calculation, we extract the interfacial thermal conductance between HfN and ScN. The interfacial thermal conductance is 1.8 GW/m^2 K, which is 3 times higher than that of AlN/GaN.

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