

Abstract Submitted
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Si/Ge Superlattice Structures for Thermoelectric Power Generation JAMES CAYLOR, RAMA VENKATASUBRAMANIAN, RTI International — Research conducted at RTI into the use of thin films, in particular superlattice materials, for thermoelectric power generation has focused on three materials families: Bi₂Te₃, PbTe, and Si/Ge. The Bi₂Te₃-based superlattice materials have already produced record ZT (thermoelectric figure-of-merit) and devices using these low temperature materials ($\sim 200^\circ\text{C}$) have surpassed bulk performance during power generation. RTI has also developed the growth of Si/Ge superlattice films as well as their fabrication into power generation devices applications at higher temperatures ($\sim 500^\circ\text{C}$). Results presented will include confirmation of superlattice structure via X-ray diffraction, showing well formed satellite peaks indicative of a high-quality superlattice. In addition, data will be presented that shows the lowering of thermal conductivity by the superlattice structure with nearly a 5x reduction in lattice thermal conductivity compared to the alloy film. Initial thin-film power device results showing $>2\%$ efficiency and 2x improvement of ZT over SiGe alloys, at ΔT of 378K and T_{mean} of 484K, will be presented.

James Caylor
RTI International

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