PROSPECTS FOR A BROADENED USE OF THERMOELECTRICS IN VEHICLES

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Very large strides have been made recently in the performance of solid-state thermoelectric (TE) systems, due directly to substantial efficiency gains at the system level and through the development of hetrostructure materials. Combined, these result in at least a factor-of-two improvement in system performance with the prospect of significant additional gains in the near future. The prospect is that such systems will have advantage over today's devices within the next several years. As a result, TE's are projected to become serious contenders for cooling, heating, temperature control, and waste power recovery applications in vehicles. The characteristics and performance requirements to meet present and projected usage for specific applications are discussed. Requirements for achieving these targets are analyzed.

Present and near-term vehicle applications include small, on-board refrigerators and Amerigon's seat cooling and heating systems. Amerigon's product is given as an example of a TE product that has exhibited very good consumer acceptance, through a direct increase in personal comfort. Manufacturers have adopted the technology since it increases consumers' perceived performance of current heating, cooling, and air-conditioning (HVAC) systems and reduces vehicle energy consumption by decreasing HVAC power demand.