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## **ENERGY NANOTECHNOLOGIES**

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### **Abstract**

Nanostructures provide opportunities to engineer the transport of energy carriers. In this presentation, examples will be given from research on nanoscale heat and mass transfer mediated by phonons, electrons, and photons. Several applications of these nanostructures to energy technologies will be discussed thermoelectrics, thermophotovoltaics and photovoltaics. Efficient thermoelectric energy conversion requires a material with high electrical conductivity, low thermal conductivity, and a high Seebeck coefficient. Interfaces in nanostructures can be engineered to give desirable phonon and electron properties. For thermophotovoltaic and photovoltaic energy conversion, photonic bandgap structures and surface waves can be exploited for the spectral and intensity control of radiation. The rich opportunities of utilizing nanoscale heat transfer phenomena to improve macroscale energy technologies will be emphasized through these examples.

