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### **Recent Advances in Thermoelectric Nanocomposite Materials**

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A short review of some of the important results over the last several years will be given with an emphasis on non-traditional materials such as skutterudites, which employ cage structures and thin film superlattices grown by MOCVD and MBE methods. Recently, there has been an ever-increasing research effort on thermoelectric nanocomposite materials. Composites using a mixture of bulk thermoelectric materials with nanoparticles incorporated within the bulk are of specific interest. One of the main goals is to have additional design or tuning parameters for materials (such as dimensionality) in order to manipulate and control the phonon scattering mechanisms, without significantly deteriorating the electrical transport properties. This means that one must deal with different length scales for the scattering processes. The role of phonons may be one of the most important parameters to understand in these novel materials. The ability to decouple the electron and phonon scattering mechanisms is very important in the development of higher efficiency thermoelectric (TE) materials, wherein the figure of merit,  $ZT$ , can be greater than unity.