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Phonon density of states in nanocrystalline Si1-xGex explored by inelastic neutron scattering STEPHEN WILSON, CHETAN DHITAL, ZHIFENG REN, Department of Physics, Boston College, Chestnut Hill MA, DOUG ABERNATHY, Spallation Neutron Source, Oak Ridge National Lab, Oak Ridge Tennessee — Recently there have been significant advances in the efficiencies of traditional thermoelectric compounds gained via the creation of thermoelectric nanocomposites possessing substantially reduced thermal conductivity relative to their bulk counterparts [1,2]. The dramatic reduction in the heat transport of these nanocomposites is often attributed to the increased interface scattering of phonons or induced surface/boundary modes; however notably little work has been put worth into exploring the detailed changes in the phonon density of states in many of these functional nanocomposite samples. Here we present inelastic neutron scattering measurements exploring the phonon density of states in a series of Si1-xGex thermoelectric nanocomposites. The evolution of the phonon spectral weight distribution and linewidths as a function of Ge-doping will be discussed and compared to the known bulk phonon density of states in this system.

[1] Giri Joshi et al., Nano Letters 8, 4670 (2008).
[2] X. Wang et al., App. Phys. Lett. 93, 193121 (2008).

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