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Effects of temperature and chemical order on phonons in Fe-V alloys MATTHEW LUCAS, Oak Ridge National Lab, JORGE MUNOZ, California Institute of Technology, OLIVIER DELAIRE, Oak Ridge National Lab, BRENT FULTZ, California Institute of Technology, DOUGLAS ABERNATHY, MATTHEW STONE, MARK LOGUILLO, Oak Ridge National Lab — Inelastic neutron-scattering spectra were measured on body-centered-cubic Fe-V alloys as a function of temperature and composition. These data were reduced from time-of-flight histograms to spectra that resemble the phonon density of states (DOS), but were distorted by differences in efficiencies of the atom species for phonon scattering. Nuclear resonant inelastic x-ray scattering spectra were measured for the 57-Fe isotope in a similar set of alloys at room temperature to compliment the neutron spectra. With temperature the 50-50 alloy undergoes an ordering transition from A2 to B2, as evidenced by increasing intensity in the superlattice peaks from the elastic regime of the neutron spectra. This ordering is accompanied by a change in the phonon DOS. The Connolly-Williams cluster inversion method is performed on the DOS of the disordered Fe-V alloys in order to correlate changes in the chemical order with changes in the DOS for the 50-50 alloy. The temperature dependence of the DOS of the disordered alloys is used to determine the anharmonic phonon entropy, and the chemical dependence to determine the phonon entropy of mixing.

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